Perceived Strengths and Difficulties in Adolescents with and without Hearing Impairment

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ABSTRACT
While studies on parent or teacher reports often found young people with hearing loss to show elevated psychological problems, results are less clear when using adolescent self-reports. The aim of the present study was to analyse self-perceived strengths and difficulties of German adolescents with hearing impairment. A sample of 181 adolescents with hearing impairment from eight special schools (mean age: 14.5 years) and 260 hearing peers from three regular schools filled in the German self-report form of the Strengths and Difficulties Questionnaire. 1 Adolescents with hearing impairment were found to have a higher Total Difficulties Score and to report more conduct problems in particular. However, they also reported higher levels of prosocial behaviour than their hearing peers. In addition, adolescents who are deaf reported more emotional symptoms and peer problems than their hard of hearing peers, and those with acquired hearing loss experienced higher hyperactivity-inattention than adolescents with congenital hearing impairment. Young people with acquired deafness had the highest Total Difficulties Score and were most likely to report emotional symptoms. All between-group differences can be interpreted as small in a statistical sense. About 43% of this group scored above the clinical cut-off for total difficulties and emotional problems, and 50% for peer-problems. We conclude that adolescents with hearing impairment, and those with acquired deafness in particular, may need to be screened for emotional and behaviour problems. Young people with acquired deafness are in particular need of measures aimed at preventing and reducing emotional and peer-related problems, such as promotion of social and emotional competencies.

KEYWORDS
Hearing impairment; deaf; psychological health; adjustment; psychological problems; prosocial behaviour

Introduction
About 5% of American adolescents have mild hearing impairment of greater than or equal to 25 dB, 2 and similar numbers could be expected in other Western countries.
An important question is whether hearing impairment increases the risk of behaviour and emotional problems. Behaviour and emotional problems of young people with hearing impairment may result from reduced communicative competence and the associated restriction of social contacts, elevated problems with emotion control and inhibition of behaviour impulses, elevated risk of being bullied, and other factors.

However, results are inconsistent regarding whether young people with hearing impairment show elevated levels of emotional and behaviour problems. Some studies using the Strengths and Difficulties Questionnaire (SDQ) found that children and adolescents with hearing impairment have more psychological problems than their hearing peers, while other studies found this only for part of their comparisons or detected no significant between-group differences. One study even found girls with hearing impairment to have a significantly lower Total Difficulties Score than girls without hearing impairment, although no between-group differences were found in boys. A meta-analysis on 12 studies reported small elevated levels of the Total Difficulties score and of emotional and peer-problems while hyperactivity and conduct problems did not differ from healthy peers or test norms. Another meta-analysis of studies that used the Child Behaviour Checklist found higher levels of total problems, internalizing and externalizing problems of children and adolescents with heterogeneous degrees of hearing impairment.

Some measures of psychological adjustment assess not only emotional and behaviour problems but also positive adjustment, such as prosocial behaviour. Although the meta-analysis by Stevenson et al. found, on average, less prosocial behaviour in young people with hearing impairment than in their hearing peers, a larger number of individual studies found similar levels of prosocial behaviour in both groups, and one study even indicated that young people with hearing impairment may show more prosocial behaviour than their peers.

Several factors may contribute to the heterogeneity of available results. First, there may be rater effects. Studies that found elevated emotional and behaviour problems used parent or teacher reports. Studies based on adolescent self-reports often found no significant differences between young people with and without hearing impairment. Rater effects may indicate that adolescents tend to underreport their psychological problems or that some parents and/or teachers overestimate the prevalence of these problems. Second, age differences may play a role. Studies with self-report measures assessed psychological problems in adolescents, while parent and teacher reports were most often used in studies on children. In the meta-analysis by Stevenson et al., between-group differences significantly declined with increasing age only in one out of 18 analyses.

Third, differences in sample sizes may have contributed to the heterogeneity of the findings. Studies that were based on adolescents’ self-report used small samples of 22 to 58 young people with hearing impairment. These studies had low test power for identifying small differences between groups. Fourth, severity of hearing impairment may play a role. The only study that did not find differences in parent-rated psychological problems assessed children with mild hearing impairment. However, direct comparisons of young people with different levels of hearing impairment were inconsistent regarding whether higher levels of impairment are associated with more psychological problems. Finally, cultural differences, such as availability of special versus integrated schooling, or use of bilingual education versus sign language in special schools for students with hearing impairment, may have contributed to the heterogeneity of results.

Research Questions

Because available studies with self-reports of emotional and behaviour problems of students with hearing impairment used small samples and had limited statistical
power for identifying small between-group differences, the first goal of the present study was to analyse levels of emotional and behaviour problems in larger samples of adolescents with and without hearing impairment. The first research question therefore asks whether adolescents with hearing impairment (from special schools) report higher SDQ problem scores than their hearing peers. As the SDQ also assesses prosocial behaviour, we also analysed between-group differences on this subscale.

In the second research question we ask whether differences between adolescents with and without hearing impairment vary by age. This question has rarely been addressed before.

Because available results are inconclusive as to whether young people with more severe levels of hearing impairment report higher levels of emotional and behaviour problems,\textsuperscript{3,4,7,13,17} the third research question asks whether students from special schools who are deaf report more behaviour and emotional problems than their peers who are hard of hearing.

It is not clear whether psychological problems differ between individuals with congenital and acquired hearing impairment. On the one hand, congenital deafness could be expected to have more serious consequences for language development than deafness that is acquired after already having some contact with spoken language.\textsuperscript{22} This may lead to greater emotional and behaviour problems.\textsuperscript{3} On the other hand, individuals with congenital hearing impairment had more time to adapt to their condition than their peers with acquired loss, which could reduce psychological problems. Effects of age at diagnosis of hearing impairment have rarely been assessed, and three studies found no relationship between age at diagnosis of hearing impairment and psychological problems.\textsuperscript{10,12,23} Nonetheless, two of these studies had limited test power for identifying small effect sizes. Given the limited research on this topic, the fourth research question asks whether levels of psychological problems of students from special schools with congenital hearing impairment differ from those of their peers with acquired hearing loss. Finally, we ask whether there may be an interaction effect of level and onset of hearing impairment (acquired vs. congenital). This question has, to our knowledge, not been addressed in previous studies.

\textbf{Methods}

\textbf{Sample}

Data were collected from 181 adolescents with hearing impairment; 48 of them had profound hearing impairment (> 90 dB), 37 had severe hearing impairment (between 71 and 90 dB), 55 had moderate hearing impairment (between 40 and 70 dB), and 41 had mild hearing impairment (between 20 and 40 dB). Most adolescents had congenital hearing impairment (\(N = 112\)) while 69 had acquired hearing loss (mean reported age at onset: 5.08 years, \(SD = 3.42\)). As universal \textit{newborn hearing screening has been implemented in Germany}, congenital hearing impairment is usually detected at a very early age. At the time of data collection, the adolescents were, on average, 14.54 years old (range: 11-18; \(SD = 1.50\)); approximately 48% of them were female.

The adolescents were recruited from grade 6 to grade 10 of eight German schools for students with hearing impairment. The participation rate was 82.3%. We focused on special schools because in Germany some 70% of students with hearing impairment attended these schools\textsuperscript{24}, and larger numbers of students from integrated schools were, therefore, difficult to locate. Because none of the special schools exclusively taught in sign language, all students with hearing loss used, at least in part, oral language. Approximately 40% of the participants attended the lowest school track (\textit{Hauptschule}), 13% attended the middle school track (\textit{Realschule}), while the others attended an integrated comprehensive school (\textit{Gesamtschule}) where the decision about completing a particular school track is postponed. After permission had been obtained from the school boards, the parents, and the
students, 6th to 10th-graders were asked to fill out a questionnaire in their classes.

In addition, 260 6th to 10th-graders without hearing impairment participated. About 11% of the students in the classes did not participate in the study due to a lack of parental permission, interest, or being absent on the day of data collection. These hearing students were recruited from three German schools located near the special schools. Similar to the sample with hearing impairment, we collected data from hearing students from the lowest school track, middle school track, and from an integrated comprehensive school.

Students with hearing impairment were significantly older than their hearing peers (M = 14.54 years vs. M = 14.12 years; t(440) = 2.94, p < .01, d = .28). In addition, their parents were less likely to have completed the highest school track (34% vs. 46%; \( \chi^2(1) = 4.10, p < .04 \)). The two groups did not differ with regard to gender (\( \chi^2(1) = 2.69, p < .11 \)) or percentage of students attending the lowest school track (\( \chi^2(1) = .87, p < .35 \)). Selected sample characteristics are shown in Table 1.

### Measures

**Emotional and behaviour problems.** We used the German version of the self-report form of the SDQ.\(^{1,25}\) The SDQ is a brief behavioural screening questionnaire that provides balanced coverage of children’s and young people’s behaviours, emotions, and relationships. With the SDQ, attributes are assessed referring to the past six months (with 0 = not true, 1 = somewhat true, 2 = certainly true) comprising five dimensions. Each of the five dimensions is measured by five items. Each of the five dimensions is measured by five items. Sample items are “I am often unhappy, down-hearted or tearful” (emotional problems), “I get very angry and often lose my temper” (conduct problems), “I am restless, I cannot stay still for long” (hyperactivity/inattention), “Other children or young people pick on me or bully me” (peer problems), and “I am helpful if someone is hurt, upset or feeling ill” (prosocial behaviour). The items of the first four scales are added together to create a Total Difficulties Score. The appropriateness of using the SDQ with children with hearing impairment has been established.\(^3\) The SDQ has been translated into Australian\(^1^1\) and British Sign Language.\(^2^6\) Positive correlations have been shown between parent-ratings, teacher-ratings, and self-ratings of students with hearing impairment (e.g., Total Difficulties: \( r = .25-.67 \)).\(^1^1,1^7,2^6\) The German self-report version of the SDQ has demonstrated good validity with respect to the differentiation between clinically defined cases and non-cases and in differentiating subcategories of psychiatric disorders.\(^2^7\) In the present study, Cronbach’s \( \alpha \)’s varied between .54 (conduct problems) and .72 (Total Difficulties).

**Hearing loss.** Based on Feldman, Salinas, and Tang,\(^2^8\) participants indicated their degree of hearing loss as mild (20-40 dB), moderate (41-70 dB), severe (71-90 dB), and profound (> 90 dB).
Sociodemographic variables. Age (in years), gender (1 = male, 2 = female), highest educational attainment of parents (2 = at least one parent completed the highest school track that gives access to university, 1 = others), and school track (1 = lowest track/Hauptschule, 2 = middle track/Realschule, 3 = comprehensive school/Gesamtschule) were assessed with single-item indicators.

Results

In the first and second research questions, we asked whether SDQ scores differed between adolescents with and without hearing impairment as well as between different age groups. Because we had very few participants at the age of 11 and 18 years, we performed a median split (11 to 14-year-olds versus 15 to 18-year-olds) in order to obtain more robust results. An analysis of covariance was computed with Total Difficulties as dependent variable, hearing status (hearing impairment vs. no hearing impairment) and age group as independent variables, and parental educational attainment as covariate. Similarly, multivariate analysis of covariance (MANCOVA) was used to identify between-group differences in SDQ subscales. Power analysis (G*Power 3.1.8) indicates a statistical power of .95 for identifying small differences of .20 standard deviation units between adolescents with and without hearing loss.

Total Difficulty Scores varied by hearing status (Table 2). Adolescents with hearing impairment reported higher Total Difficulties than their hearing peers (d=.25 standard deviation units). The main effect of age and the interaction effect of hearing status and age did not reach statistical significance.

MANCOVA indicated that the scores on the SDQ subscales varied between adolescents with and without hearing impairment (F(5,367)=5.62, p<.02). Hearing status explained 7.1 percent of variance of the dependent variables. The main effect of age did not reach statistical significance (F(5,367)=1.35, n.s.). A marginally significant hearing status x age interaction was found

<table>
<thead>
<tr>
<th>Scale</th>
<th>Hearing impairment</th>
<th>No hearing impairment</th>
<th>Hearing status</th>
<th>Age</th>
<th>Interaction effect: age x hearing status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11-14 years</td>
<td>15-18 years</td>
<td>11-14 years</td>
<td>15-18 years</td>
<td>F(1,420)</td>
</tr>
<tr>
<td>Total Difficulties</td>
<td>12.12</td>
<td>11.56</td>
<td>4.54</td>
<td>10.90</td>
<td>4.91</td>
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<td>Emotional symptoms</td>
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<td>2.93</td>
<td>2.33</td>
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<td>2.02</td>
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<td>1.69</td>
<td>2.27</td>
<td>1.44</td>
<td>2.15</td>
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<td>Hyperactivity - inattention</td>
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<td>2.10</td>
<td>3.89</td>
<td>2.11</td>
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<td>Peer problems</td>
<td>3.21</td>
<td>1.97</td>
<td>2.58</td>
<td>1.87</td>
<td>2.68</td>
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<td>7.49</td>
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<td>6.52</td>
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<td>88</td>
<td>93</td>
<td>151</td>
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</table>

Note. M = mean, SD = standard deviation, η² = variance explained by the predictor. *p < .05, ***p < .001.
(F(5,367)=2.03, p<.08), which explained 2.7% of the variance of the dependent variables. Finally, parental educational attainment had a significant effect (F(5,367)=2.73, p<.02, \( \eta^2 = .036 \)), and adolescents from families with higher educational attainment reported fewer psychological problems than their peers from other families.

Univariate F-tests indicated that adolescents with hearing impairment reported more conduct problems than their hearing peers (d=.23). However, they also reported higher levels of prosocial behaviour than their peers without hearing impairment (d=.33). Peer problems varied by age, with older adolescents reporting fewer problems (d=.19). Finally, a significant hearing status x age interaction effect on prosocial behaviour was observed. While older adolescents without hearing impairment tended to report higher levels of prosocial behaviour, the reverse was found in adolescents with hearing impairment. According to Cohen’s criteria, the effect sizes could be interpreted as small.

In the next research question, we were interested in differences between adolescents who are deaf and hard of hearing as well as between young people with acquired and congenital hearing impairment. We first tested whether the groups differed by sociodemographic variables and found no significant differences. An analysis of variance was computed with hearing status (deaf vs. hard of hearing) and onset of hearing impairment (congenital vs. acquired) as independent variables and Total Difficulties as dependent variable. The analysis had a statistical power of .91 for detecting moderate effect sizes of d=.50. We found main effects of hearing status and of congenital versus acquired hearing impairment as well as an interaction effect of hearing status and onset of hearing impairment. Adolescents who are deaf reported a higher Total Difficulties score than their hard-of-hearing peers (d=.31). In addition, participants with acquired hearing loss had higher scores than their peers with congenital hearing impairment (d=.22). Finally, the interaction effect indicates that adolescents with acquired deafness reported higher Total Difficulties than the other subgroups (Table 3).

Next, a multivariate analysis of variance was computed with hearing status (deaf vs. hard of hearing) and onset of hearing impairment (congenital vs. acquired) as independent variables and SDQ subscale scores as dependent variables. We found main effects of hearing status (F(1,173)=2.77, p<.02, \( \eta^2 = .074 \)), onset of hearing impairment (F(1,173)=2.30, p<.05, \( \eta^2 = .062 \)), but no interaction effect of hearing status and onset (F(1,173)=1.40, n.s.). Univariate F-tests indicated that

<table>
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<tr>
<th>Scale</th>
<th>Hard of hearing</th>
<th>Deaf</th>
<th>Hearing status</th>
<th>Age at onset</th>
<th>Hearing x age at onset</th>
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<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Total Difficulties</td>
<td>11.43</td>
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<td>2.30</td>
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<td>3.32</td>
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<td>1.42</td>
<td>2.71</td>
<td>1.57</td>
<td>2.31</td>
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<td>4.11</td>
<td>2.07</td>
<td>3.12</td>
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<tr>
<td>Peer problems</td>
<td>2.83</td>
<td>1.79</td>
<td>2.66</td>
<td>1.73</td>
<td>3.12</td>
</tr>
<tr>
<td>Prosocial behaviour</td>
<td>7.79</td>
<td>1.82</td>
<td>7.30</td>
<td>2.02</td>
<td>7.56</td>
</tr>
</tbody>
</table>

Note. M = mean, SD = standard deviation, \( \eta^2 \) = variance explained by the predictor. *p < .05, **p < .01, ***p < .001.
adolescents who are deaf reported more emotional symptoms and peer problems than their peers who are hard of hearing (d=.48 and d=.33). In addition, adolescents with acquired hearing loss reported more symptoms of hyperactivity/inattention than their peers with congenital hearing impairment (d=.40). Finally, an interaction effect of hearing status and onset of hearing impairment was found on emotional problems: These problems were most often reported in adolescents with acquired deafness (Table 3). Effect sizes were, again, small.29

Table 4 shows the percentage of adolescents with hearing impairment who scored above the recommended clinical cut-off (90th percentile).25 These numbers should be interpreted with caution as we had to rely on data from the British normative sample because no German norms and cut-off scores for SDQ self-reports are available. Highest numbers of adolescents with hearing impairment scored above the cut-off for peer problems (33.1%). Fifty percent of adolescents with acquired hearing loss scored above the cut-off for peer-problems as well as 42.9% above the cut-off for emotional problems and total difficulties.

Discussion

In the present study, participants with hearing impairment reported higher levels of Total Difficulties, conduct problems, and prosocial behaviour than their hearing peers. Adolescents who are deaf reported more Total Difficulties, emotional symptoms and peer problems than their hard of hearing peers. In addition, young people with acquired hearing loss reported more Total Difficulties and symptoms of hyperactivity/inattention than their peers with congenital hearing impairment. Finally, individuals with acquired deafness were most likely to experience Total Difficulties, emotional problems and peer problems. When interpreting the data, we have to be aware that the participating students came from a limited number of schools, and results may vary when selecting other schools, for example depending on socioeconomic characteristics of the school district or school climate.

While most studies with parent and teacher SDQ reports found elevated psychological problems in adolescents with hearing impairment,3,5,7-10,13 the present study showed that this is also the case when using adolescent self-reports. As between-group differences were small, they were probably not identified in previous studies on self-reports with small sample sizes.11-12,15,17 The observed elevation of conduct problems may be explained, at least in part, by deficits in executive functioning, such as inhibition of behaviour impulses.4,5

Similarly to Anmyr et al.,15 we found that adolescents with hearing impairment, and younger adolescents with hearing impairment in particular, report more prosocial behaviour than their hearing peers. This result may be explained by the fact that the promotion of prosocial behaviour is an important goal of German special schools for students with disabilities.30
Emotional and peer problems were more often reported by adolescents who are deaf than by those who are hard of hearing, thus indicating that more severe hearing impairment restricts communication and making friends, and related sources of positive feelings.3,4 Higher hyperactivity/inattention in adolescents with acquired rather than congenital hearing impairment may indicate that some sources of acquired hearing loss, such as meningitis, negatively affect attention and behaviour control.31 Unfortunately, we could not test this suggestion because our question on sources of hearing impairment often remained unanswered. Interestingly, individuals with acquired deafness reported the highest Total Difficulties and emotional symptoms, and up to 50% scored above the British clinical cut-off of individual scales. These adolescents may have the most problems coping with their hearing impairment, such as learning lip reading, and mourn the loss of their hearing the most.32

Limitations and Conclusions

Some limitations of the present study should be mentioned. First, only data from adolescents with hearing impairment from special schools were available. Students with a higher degree of hearing impairment are more likely to attend special schools.4,21 However, results are inconclusive as to whether students from special schools or mainstream schools show more psychological problems.7,21 Second, as we selected students from a limited number of schools, our results may not be representative for the total national population. Third, only SDQ self-reports were available. Nonetheless, moderate to high correlations between adolescent self-ratings and teacher/parent ratings have been found in previous studies, thus supporting the validity of self-reports.11,17,26 Fourth, similar to other studies, internal consistency of the SDQ scales was low to moderate, reflecting the low number of items per scale.1,11,17,26-27 Fifth, the cut-offs were based on British data because no German cut-offs have been established for SDQ self-reports. Finally, when comparing individuals who were deaf and hard-of hearing, we had limited test power for identifying small effect sizes.

Despite these limitations, several conclusions can be drawn. First, we conclude that elevated levels of psychological problems in adolescents with hearing impairment are not specific to studies using parent and teacher reports but can also be found when using adolescent self-reports. Second, adolescents with acquired hearing loss and those who are deaf seem to be at higher risk of reporting psychological problems. Adolescents with acquired deafness were found to be at a particular risk for developing emotional and peer-problems. Third, because between-group differences emerged only for a subset of the assessed domains, we conclude that future studies should assess a range of areas of psychological adjustment rather than examining only global adjustment. Fourth, our results indicate that adolescents with hearing impairment, and those with acquired deafness in particular, may need to be screened for emotional and behaviour problems. Screening instruments available in the first language of the child should be used. Psychological interventions should be offered for those with elevated problems. A good target of intervention would be the promotion of social and emotional competencies, and a well-evaluated program that targets these aspects is PATHS (Providing Alternative THinking Strategies).33 Finally, it would be interesting to replicate the study with students with hearing impairment who attend integrated schools.

References


