

EMPIRICAL MANUSCRIPT

Mental Health of Deaf and Hard-of-Hearing Adolescents: What the Students Say

P. Margaret Brown^{*,1} and Andrew Cornes^{1,2}¹University of Melbourne and ²View Psychology Limited

*Correspondence should be sent to P. Margaret Brown, Melbourne Graduate School of Education, University of Melbourne, Victoria 3010, Australia (e-mail: p.m.brown@unimelb.edu.au).

Abstract

This study investigated the mental health problems of 89 deaf and hard-of-hearing (DHH) adolescents in New South Wales, Tasmania, and Western Australia. Participants completed the written (for oral students) or signed version for competent Australian Sign Language (Auslan) users version of the Youth Self Report (YSR). Students were educated in a range of educational settings, had varying degrees of hearing loss, and used a range of communication modes. Results showed that, overall, DHH students reported increased levels of mental health problems compared with hearing peers. The broadband syndromes were more than 3 times more likely to be reported, while the narrowband syndromes were between 2 and 7 times more likely. A binary logistic regression analysis showed that the language used at home was a significant predictor of mental health problems. The implications of these findings for the social, emotional, and mental well-being of DHH students and the training of professionals are discussed.

The most recent report from [Australian Hearing \(2013\)](#) indicates that each year about 12 children per 10,000 live births are born with a moderate, severe, or profound hearing loss in both ears. A further 23 children per 10,000 will acquire a hearing impairment that requires hearing aids because of accident, illness, or other causes. Each year, Australian Hearing fits around 2,000 children with hearing aids for the first time. Currently, there are approximately 16,300 individuals under the age of 21 being supported with hearing aids and cochlear implants in Australia. Given that a national survey of the mental health of Australian children and adolescents revealed that 14% of children and adolescents were categorized as being in the clinical range ([Sawyer et al., 2001](#)), a conservative estimate of mental health problems in deaf and hearing impaired students would be between 2,500 to 3,000.

Approximately 90–95% of deaf children are born to hearing parents ([Moores 2001](#)). Frequently, there are significant difficulties with parent–child interaction as parents adjust to the knowledge of their child's deafness and find the most effective way to communicate with their child ([Hintermair, 2006](#)). Moreover, for deaf and hard-of-hearing (DHH) children, access to incidental

learning within school and family contexts is often restricted because of difficulties in communication and the hearing loss per se. These children may also display difficulties in abstract thinking and problem-solving skills that adversely affect their academic achievement ([Marschark, 1993](#)), ability to form peer relationships and development of self-esteem ([Scheetz, 2004](#)). In short, the unique patterns of social and emotional development seen in DHH children may predispose them to increased psychological distress.

The prevalence of mental health problems in this population has, however, been difficult to establish for a number of reasons. One of the major issues in the interpretation of research has been the heterogeneous nature of children and students with hearing loss relating to degree and type of hearing loss, age of onset, age of diagnosis, communication, and cultural identification. A further, and perhaps more significant issue, has been the appropriateness of instruments used to assess mental health, particularly for those students whose first language is not English.

Much of the research reporting the prevalence of mental health problems in DHH youth has utilized parent reports ([Van](#)

Eldik, Treffers, Veerman, & Verhulst, 2004; van Gent, Goedhart, Hindley, & Treffers, 2007; Vostanis, Hayes, Du Feu, & Warren, 1997) such as the Child Behavior Checklist (CBCL) of the Achenbach System of Empirically Based Assessment (ASEBA) (Achenbach & Rescorla, 2001). A further study by Fellingner, Holzinger, Sattel, Laucht, and Goldberg (2009) used the parent reports of the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997). Collectively, these reports suggest rates between about 28% (van Gent et al., 2007) and close to 43% (van Eldik et al., 2004; Vostanis et al., 1997) on these standardized measures. An even higher rate (71%) was reported using a non-standardized parent checklist (Vostanis et al., 1997).

A few studies have investigated the prevalence of mental health problems by collecting data from children and students themselves and reveal varying prevalence rates. Wallis, Musselman, and MacKay (2004) used the Youth Self Report (YSR) of the ASEBA (Achenbach & Rescorla, 2001) and reported 54% of students with hearing loss experiencing a mental health problem. Van Eldik (2005) also used the YSR and found that 39% of boys and 34% of girls reported problems. Fellingner, Holzinger, Sattel, and Laucht (2008), using the student form of the SDQ (Goodman, 1997), reported a rate of 32.6%.

While overall the findings are complicated by various factors, such as the selection of participants in the study (e.g., degree of hearing loss of the participants, the language the students used, and their educational setting), the method of data gathering (e.g., the use of scales, interviews, and standardized measures), and the sources of the data (e.g., teacher informants, parent informants, and self-reports), a major problem has been the unsuitability of written instruments, particularly for students using a signed language. In an effort to overcome this, some studies have used adjusted versions of the instruments in which the language has been simplified (Wallis et al., 2004; van Eldik, 2005), although little difference in prevalence rates were found. Cornes, Rohan, Napier, and Rey (2006), however, showed a considerable discrepancy in the prevalence rate reported by students between their use of both a written and a signed version of the YSR and this was replicated by Cornes and Brown (2012) for written and signed versions of the SDQ. However, these latter two studies took into account only students who were proficient in Australian Sign Language (Auslan) and did not include students using spoken English only and therefore do not account for the heterogeneity of the population of DHH students.

A further important issue relates to the constellation of emotional and behavioral problems experienced by DHH students. Most of the research into self-reports has investigated the prevalence of the "broad band" Internalizing and Externalizing scales using the YSR and these are reported as between 37 and 40% (van Eldik, 2005; Wallis et al., 2004). When investigating the prevalence of problems related to the 'narrow band' scales, Fellingner et al. (2009) showed that DHH adolescents suffered from higher rates of depression, while Cornes et al. (2006) also found a higher prevalence of withdrawal/depression, somatic complaints, social problems, and thought problems in this population compared with hearing peers. Again, however, this latter sample did not include students using only spoken English.

Some studies of the mental health of DHH youth have investigated associations between such problems and other factors. The findings show significant associations with IQ (van Eldik, 2005; van Eldik et al., 2004; van Gent et al., 2007), poor communication overall (van Eldik et al., 2004), and poor communication between the child and parents (Wallis et al., 2004). Similarly, Mejstad, Heiling, and Svedin (2009) reported a significant association between the presence of emotional and behavioral

problems as measured on the SDQ and degree of deafness, while van Gent, Goedhart, and Treffers (2012) found a higher incidence of psychopathology in children and adolescents with more severe degrees of deafness. Mejstad et al. (2009) also reported an association with gender (boys having more mental health problems than girls). The picture is less clear in relation to school placement, with van Eldik (2005) finding a significant association and Mejstad et al. (2009) finding no relationship between these variables. One of the difficulties in interpreting these findings, however, is that some of the variables may be inter-related.

In summary, the prevalence of mental health problems in DHH students remains unclear, and this is likely due to a range of factors such as the instruments used, the informants who provide the data, and most importantly the appropriateness of the instruments for some members of the population. The limited studies available worldwide that examine the rates of mental health distress experienced by deaf youth are further compromised by an absence of self-reports. These studies rely heavily on parental and teacher reports which have reported lower rates of disturbance (Comes et al., 2006). While data from multiple informants are useful to provide baseline information and inform clinical assessment in mental health services, the focus of our study was to address a gap in the literature and examine how students viewed their own mental health.

The contribution of background variables to mental health problems in this population also remains unclear. Although there are some studies investigating these issues, they have investigated such variables in isolation from each other, ignoring their possible combinatorial effects.

This study attempted to redress some of the above issues. The aims of the study were threefold. The first aim was to establish the overall incidence of DHH students' self-reports of mental health issues using a standardized measure (with a signed version of the instrument for students using sign language) within a group of students varying in terms of degree of hearing loss, family history of hearing loss, means of communication at home and at school, educational setting, and age. It was hypothesized that the incidence rates would be elevated in comparison to rates in hearing peers. The second aim was to identify the prevalence of the narrowband and broadband syndrome scales in this heterogeneous group. It was hypothesized that these comparative rates likewise would be elevated. The third aim was to identify which background variable, or combination of variables, was associated with mental health problems. The few studies available consistently report an increase in emotional and behavioral difficulties in deaf children when compared with hearing children. Explanations for this have changed over time. While initially it was suggested that hearing impairment alone caused psychiatric disorder, more recently, the assumption has been that deaf children display more behavioral problems because of their frustration with communication (Fellingner, Holzinger, & Pollard, 2012). Given that ease of communication with family and peers are critical to self-awareness, self-esteem, and identity, it was hypothesized that communication within the family and at school would be a contributing factor in mental health problems.

Method

Participants

The participants were 89 DHH students attending a range of school settings in the states of Western Australia [$n = 35$ (39%)], New South Wales [$n = 43$ (48%)] and Tasmania [$n = 11$ (12%)] in

Australia. There were 45 females and 44 males in the sample. Table 1 provides details of the distribution of the ages of the participants by gender. All participants in the study met the criterion of intelligence within normal limits as determined from their school records. In order to complete the written version of the instrument, only students with English literacy levels of equal to, or greater, than Grade 5 equivalent (as determined by their teachers) were included in the study. Similarly, for students using the signed version only those students who were judged by their teachers to have sufficient proficiency in Auslan were included.

Twenty of the New South Wales participants attended bilingual-bicultural programs while 23 students were placed in hearing units within mainstream schools. All students from Tasmania attended bilingual-bicultural settings. In contrast, the participants from Western Australia mostly attended mainstream schools and received the services of a visiting teacher of the deaf ($n = 33$), with only two participants attending a hearing unit. The distribution of placement settings reflects the current philosophy on education of the deaf in those states.

For 47 of the students, the etiology of deafness was reported as unknown. Seventeen students were reported as having deafness of genetic origin, with a further eight reports of meningitis and six of maternal rubella infection. The remaining causes of deafness were cytomegalovirus ($n = 1$), Mondini syndrome ($n = 2$), toxoplasmosis ($n = 1$), unknown virus ($n = 3$), and other causes not usually associated with congenital deafness ($n = 4$).

Sixty-eight of the students were reported as the only person in the family with a hearing loss. Ten students had a sibling with hearing loss, nine had a parent with a hearing loss, and one had a relative who was reported as being deaf. No details of family history of deafness were provided for one student.

Four students had either a mild or mild-moderate hearing loss, 14 were either moderately or moderate-severely deaf, 14 had severe or severe-profound hearing losses, while 57 students were reported as profoundly deaf. In terms of amplification, 19 students were reported as using no form of amplification, 14 students wore one hearing aid, 39 had bilateral hearing aids, and 17 of the students had at least one cochlear implant. Thirty-five students were educated using Auslan, 21 used Signed English, and 33 used spoken English only. Their home languages were reported as Auslan ($n = 20$), Signed English ($n = 24$) and spoken English ($n = 45$). These numbers suggest that almost half of the students using Auslan at school came from homes in which their families used English, either in a signed or spoken form. In contrast, students using spoken English at school would most likely also use spoken English at home.

Instrumentation

All participants completed the YSR which is one of the three parallel instruments that comprise the ASEBA (Achenbach & Rescorla, 2001). The ASEBA was selected for use in this study because it is the most widely used measure of adaptive function and behavior and has been used extensively in previous studies on child and adolescent mental health, including international

studies on deaf populations. The ASEBA consists of three forms: the Child Behavior Checklist (CBCL), the Teacher Report Form (TRF), and the YSR. For the purposes of mental health screening, when any combination of two out of the three forms are used, students at risk of emotional or behavioral problems can be identified and referred for clinical assessment and treatment. In this study, only the results of the YSR are reported since our interest was in what the students could tell us about their mental health.

Numerous studies have provided support for the content, criterion-related, and construct validity of the ASEBA. In terms of its psychometric properties, the reliability of the YSR is adequate with test-retest reliabilities on the Problem and Syndrome Scales ranging from 0.71 to 0.95. The YSR is suitable to use with students from 11 to 18 years of age, and requires a Grade 5 equivalent reading age. It is a 112-item instrument which takes about 20min to complete and yields three different types of scores. First, there is a Total Problems Score. The instrument also gives scores on eight narrowband syndromes (Anxious/Depressed, Withdrawn, Somatic Complaints, Social Problems, Thought Problems, Attention Problems, Rule-breaking Behavior, and Aggressive Behavior). A third type of score is generated when the Anxious/Depressed, Withdrawn, and Somatic Complaints scores are combined to provide a broadband syndrome score for Internalizing, while the sum of scores on Rule-breaking Behavior and Aggressive Behavior syndromes yields an Externalizing syndrome score.

The YSR has been translated into 61 languages in its written form. Recently, Cornes (2007) developed a signed version of the YSR for use with adolescents using Auslan. This was found to have comparable internal consistency and test-retest reliability with the written version with internal consistency ranging from 0.77 to 0.97 and test-retest agreement between 0.49 and 0.78.

Procedure

Ethical approval for data collection was obtained both from the University of Sydney (where one of the authors was a doctoral candidate) and the University of Melbourne (where the other author was employed). In New South Wales and Tasmania, recruitment was conducted through contact with Deaf Societies and educational institutions to identify potential participants. Approval was obtained from the Central Sydney Area Health Service, the NSW Department of Education and Training, the Royal Institute for Deaf and Blind Children, Sydney, and the Department of Education State Support Service in Tasmania. In Western Australia, approval was obtained from the Department of Education through the Western Australian Institute for Deaf, the Telethon Speech and Hearing program, and the Catholic Education Office. In all states, the schools distributed Plain Language Statements and invitations to participate to parents and students.

Students from both New South Wales and Tasmania individually completed both the written and signed versions of the instrument for a validation analysis (Cornes et al., 2006). These students were all proficient users of Auslan. For these two groups

Table 1. Gender and age of participants

Age in years	11	12	13	14	15	16	17	18
Gender								
Male	1	10	8	5	5	6	5	4
Female	2	10	6	7	4	10	5	1
Total	3	20	14	12	9	16	10	5

of participants, only the data obtained from the signed version of the YSR were used in this analysis. For the participants from Western Australia, 33 students completed the written version of the YSR and two students, proficient in Auslan, completed the signed version.

Data Analysis

Raw data were entered into a database and Total problem scores, broadband and narrowband syndrome scores were computed using the procedure outlined in Achenbach and Rescorla (2001). The computer program categorized these scores according to whether they were in the “normal” or “borderline/clinical” range. Percentages were then calculated. These percentages provide incidence rates for Total Problems, and each of the broadband and narrowband syndrome scales. To investigate further the factors that predicted mental health problems, a binary logistic regression analysis (IBM SPSS Statistics 21) was used since this statistic takes into account correlations between the potential contributing variables.

Results

Incidence and Types of Reported Mental Health Problems

Table 2 provides details of the types of mental health problems reported by the group as a whole with comparable data from Sawyer et al.'s (2001) hearing adolescents. As this table shows, for Total Problems, 35 students were in the clinical/borderline range (i.e., 39% overall) compared with 14% for hearing counterparts. Just over 40% of students reported Internalizing Problems while 37.1% reported Externalizing Problems. Internalizing Problems were mainly comprised of Somatic Complaints and Withdrawn behavior while Externalizing Problems consisted of Rule-breaking Behavior and Aggression. In addition, just over 28% of the students reported Social Problems, and 21% Thought Problems. Anxiety/depression and Attention Problems were the least common.

Factors Contributing to Mental Health Problems

In order to investigate the contribution of background variables to the students' reported mental health issues, a binary logistic regression analysis was conducted using the presence or

absence of clinical/borderline levels of mental health. The independent variables entered into the analysis were the categorical variables *Age*, *Gender*, *Degree of hearing loss*, the presence or absence of *Deafness in the family*, *School placement*, the *Language used at school*, the *Language used at home*, and whether or not there was a *Language match between home and school*. *Age* was categorized as Younger (11–14 years) and Older (15–18). *Degree of hearing loss* was classified as Profound or Not Profound. The categories for *School Placement* were Mainstream, Hearing Unit, and Bilingual/bicultural setting. The language variables consisted of three categories: Auslan, Signed English, and Spoken English.

Prior to the analysis, correlations were computed between the background variables to assess multicollinearity. While some of the variables were found to be moderately associated with each other, a strong correlation was found between *School Placement* and *Language used at school* (Cramer's V = 0.912). Since our hypothesis was concerned with the influence on language at school and at home, *School Placement* was omitted from the analysis while *Language used at school* was included. The classification table at Block 0 (before any variables were entered into the model) showed that the success rate of predicting the absence of mental health problems was 60.7% (i.e., 54 out of 89 cases). Using a direct entry procedure, all the variables were entered into the model and the values converged after four iterations. At Block 1, the predictive value of the model rose to 72.7%. The analysis showed that if *Language used at home* were to be removed, it would have a significant effect on the model (Model Log Likelihood = -97.592, $df = 2$, $p = .000$). This binary logistic regression therefore confirms that, for this group of students, the language used at home was the only predictor of mental health problems.

Table 3 shows the frequency of reported mental health problems by language used at home. As this table shows, for the students using Signed English at home, two-thirds of the group reported mental health problems. For students using Auslan, there were almost equal numbers of students with and without reported problems while in contrast, just under one-third of the students who were using Spoken English reported mental health issues. Table 4 provides details of the numbers of students reporting clinical/borderline mental health issues for each of the groups by language used at home. As this table shows, students using Signed English at home reported elevated prevalence rates for all measures on the YSR: namely, Total Problems and each of the narrowband and broadband syndrome scores. In contrast, the students using spoken English at home reported elevated levels only for Internalizing Problems and Somatic complaints. Elevated levels of clinical problems were found in the Auslan using group for both of the broadband syndromes and all of the narrowband syndromes with the exception of Anxiety/Depression.

Figure 1 shows the distribution of the percentages of reported broadband and narrowband syndrome scores for the three groups of students as well as the percentages reported for hearing adolescents by Sawyer et al. (2001). This figure shows that

Table 2. Incidence of types of mental health problems

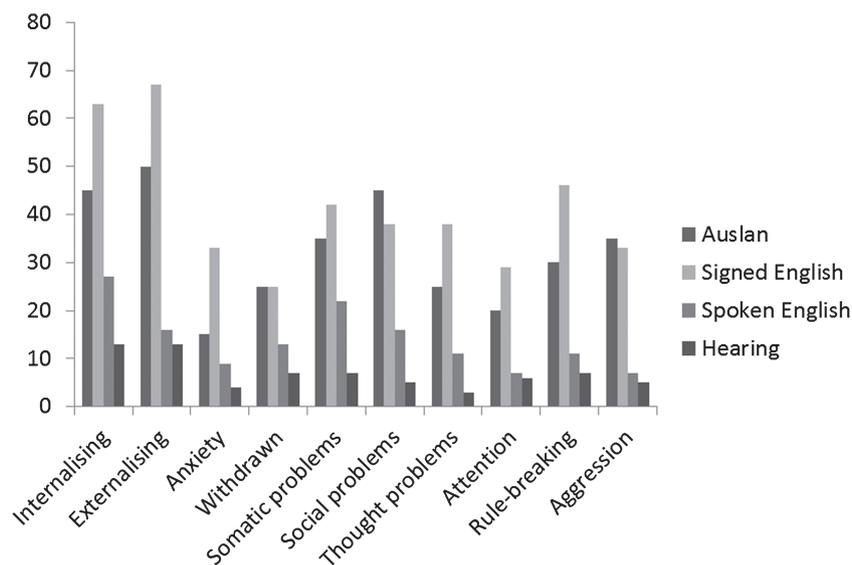
	Clinical/ borderline	Sawyer et al. (2001)	
	n	%	%
Total problems	35	39.3	14.1
Internalizing	36	40.4	12.9
Externalizing	33	37.1	12.9
Anxiety/depression	15	16.9	3.5
Withdrawn	17	19.1	4.3
Somatic complaints	27	30.3	7.3
Social problems	25	28.1	4.6
Thought problems	19	21.3	3.1
Attention problems	14	15.7	6.1
Rule-breaking behavior	22	24.7	7.1
Aggression	18	20.2	5.2

Table 3. Presence and absence of reported total problems by language used at home

Language used at home	Not clinical/ borderline	Clinical/ borderline
Auslan	11	9
Signed English	8	16
Spoken English	35	10

Table 4. Number and percentage of reported clinical problems for the broadband and narrowband syndrome scales of the YSR by language used at home

	Auslan (n = 20)		Signed English (n = 24)		Spoken English (n = 45)	
	n	%	n	%	n	%
Internalizing	9	45	15	63	12	27
Externalizing	10	50	16	67	7	16
Anxiety/depression	3	15	8	33	4	9
Withdrawn	5	25	6	25	6	13
Somatic complaints	7	35	10	42	10	22
Social problems	9	45	9	38	7	16
Thought problems	5	25	9	38	5	11
Attention problems	4	20	7	29	3	7
Rule breaking behavior	6	30	11	46	5	11
Aggression	7	35	8	33	3	7

**Figure 1.** Percentages of mental health issues as reported by students using Auslan, Signed English, or Spoken English at home compared with hearing adolescents (based on Sawyer et al., 2001).

although the incidence rates were higher for the DHH groups, the shapes of the distributions for the four groups were similar. This suggests that the students who were DHH were not experiencing a significantly different constellation of problems from their hearing counterparts.

Discussion

This study investigated mental health issues as reported by DHH adolescents in New South Wales, Tasmania, and Western Australia. The students, who ranged in age from 11 to 18 years of age, completed either the written or Auslan version of the YSR. The students were educated in a range of settings: bilingual-bicultural settings, hearing impaired units, and mainstream schools. They used Auslan, Signed English, or spoken English at school, and the majority of them used spoken English with their families.

Overall, the prevalence of mental health problems for this heterogeneous group was 39%, far above the 14% reported using the CBCL for Australian hearing children and adolescents (Sawyer et al., 2001). This finding is consistent with that of van Eldik (2005) who also used the YSR, albeit an adapted written

version. Interestingly, Cornes et al. (2006) reported a rate of 42.6% in their validation study of the signed version of the YSR in which the students all attended either a bilingual-bicultural setting or hearing impaired unit using Signed English, and all were diagnosed as profoundly deaf. For this study, a further group of students was added to the sample who predominantly attended mainstream classes and used spoken language. These students had a range of degrees of hearing loss. The addition of this group to achieve a more heterogeneous sample in terms of both placement and hearing loss did not significantly reduce the incidence of reported total problems. This suggests that this is a fairly accurate reflection of the prevalence of mental health problems in DHH adolescents. It also provides further support for the sensitivity of signed versions of mental health assessments.

For the two broadband syndrome scales, 40% of the respondents reported Internalizing problems and 37% Externalizing problems. Again these figures are similar to Cornes et al. (2006), van Eldik (2005) and Wallis et al. (2004), yet significantly different from the 12.9 and 12.8%, respectively, for hearing adolescents in Australia as reported by Sawyer et al. (2001). For the eight narrowband syndrome scales, the prevalence was between two and

seven times higher than that of hearing adolescents. The order of prevalence for these syndrome scales was found by Sawyer et al. (2001) to be Somatic complaints, Rule breaking behavior, Attention problems, Aggressive behavior, Social Problems, Withdrawn, Anxious/Depressed, and Thought problems. This pattern was largely similar in the DHH group reported here with the exception of the juxtaposition of Thought problems and Attention problems and the promotion of Social problems just behind Somatic problems. Given the significant communication issues for DHH students, the finding regarding the sevenfold prevalence of social problems is not surprising. The result for Thought problems (also seven times more likely for DHH students) possibly reflects a difficulty that these students may experience with self-reflection (Mance & Edwards, 2012), inner speech (McCarthy-Jones & Fernyhough, 2011), and emotional self-regulation (Luckner & Sebald, 2013).

In this study, 24% of the respondents reported that they had at least one family member with a hearing loss. It should be noted that respondents were not asked to discriminate whether these family members had congenital deafness or acquired a hearing loss later in life. Nevertheless, given this possible skew in our sample and the fact that this variable had not been included in previous studies, we considered it important to investigate any potential associations with mental health outcomes. The presence of other family members with hearing loss, however, was not a predictive factor.

The age of onset and progression of mental health problems in children with hearing loss is little understood. Although Van Eldik et al. (2004) found increased levels of social problems and anxiety/depression as DHH students grew older, age was not a contributing factor in this study in predicting mental health outcomes. In fact, we found a prevalence of mental health problems of 35% even in our younger group. This then suggests that there is a considerable problem by the start of secondary school and yet we know little about the genesis of mental health problems earlier than this. There is some evidence that preschoolers who are deaf or hard of hearing are delayed in their social development, but not deviant (Brown, Bortoli, Remine, & Othman, 2008), experiencing difficulties with reciprocity, mutuality, and social problem solving. Furthermore, young DHH students have been shown to exhibit a reduced range of strategies for initiating and maintaining social interaction with peers (Roberts, Brown, & Rickards, 1996). Whether the prolongation of such difficulties (including misinterpreting social information and a lack of access to incidental learning) experienced by these students in their primary school years lie at the heart of mental health problems remains to be investigated.

Included in the binary logistic regression were four other background variables: degree of hearing loss, the language used at school, the language used at home, and whether there was a mismatch between the home and school languages. Only the language used at home emerged as a significant variable in the model, although degree of hearing loss approached significance ($p = .05$). When students were categorized according to the language they used at home and the prevalence rates of reported mental health problems calculated, the students using spoken English with their families emerged as experiencing fewer problems than did those whose families were using Auslan or Signed English. Those using Signed English at home reported elevated rates for all narrowband and broadband syndromes, but particularly for Internalizing, Externalizing, Rule breaking behavior, and Somatic complaints. Given that these students would have been predominantly born into hearing families, it is possible that the efforts that parents make to communicate in this

way may compromise the quality and sensitivity of communication between them and their child. Elevated levels were also found for the students who used Auslan at home. While some of these students would have come from Deaf families, others would have been from hearing families in which the parents were attempting to communicate in a second language acquired in adulthood. This would affect not only their fluency, but also their ability to communicate deeply and sensitively which could interfere with attachment. About half of these students reported Internalizing, Externalizing, and Social problems, although they were significantly less likely to report Anxiety/Depression. These findings add further to those of Wallis et al. (2004), emphasizing the importance of quality of communication rather than mode of communication.

The students using spoken English at home reported almost twice the prevalence of Internalizing problems as did their hearing counterparts, but the incidence was much less than that reported for the students who used a form of signing at home. Interestingly, these students also reported a level of Externalizing behavior that was similar to that of their hearing peers, whereas this was a major issue for the remaining students. Although assessment of the linguistic competence both of the students and their families was beyond the scope of this study, it is clearly a factor that should be included in any further investigation.

These results suggest strong links between social problems, behavior, communication, and mental health. The more restricted communication occurring between DHH students and their parents and teachers may result in discussions about concrete themes and less abstract thoughts and emotions. As children develop it is important that such communication not only reflects their current level of development but also promotes it, and this may be problematic for DHH children. This has implications for teachers and others who work with these students and their parents, particularly in the area of promoting social and emotional aspects of learning.

There is limited research into developing specific screening tools for deaf children in a native sign language and a lack of reliability data. This study provides some evidence to suggest that prevalence of mental disorder among deaf adolescents is much higher than in the general community. Professionals need to be trained in the screening of students for mental health problems, in interventions for students who are experiencing social, emotional, and thought problems, and in working alongside parents. In addition, school systems need to implement procedures for the screening of students at an appropriate age, protocols, and personnel for the support of families of students with mental health problems and their teachers.

There is no definitive link between family communication and increased rates of mental health problems in deaf adolescents, yet using a binary logistic regression, we found that the language used at home was the only predictor. It should be noted that when the variables were checked for multicollinearity, a moderate association was found between the language used at home and degree of hearing loss with spoken English being used more frequently with students with milder losses and Signed English or Auslan being used with students who had more profound hearing losses. Nevertheless, degree of hearing loss per se was not a predictor of mental health issues. A limitation of the study was that the fluency of communication at home was not measured so it is possible that the hearing parents in this study, while being fluent in spoken English, may not have been sufficiently fluent in Signed English or Auslan. Clearly, the decision about which communication approach to use is an

important one for parents to make to ensure communication in the early years, but it has important ramifications for shared communication in the home and therefore the social and emotional well-being of DHH individuals. Although this was a small sample of students, the finding regarding the language used at home requires further investigation.

Acknowledgments

The authors would like to gratefully acknowledge the students, parents and teachers who participated in this study. We are also grateful to Professor John Hattie for his statistical advice. We dedicate this article to the memory of our friend and colleague, Dr Maria Remine (1971–2010), who collected the data from Western Australia, conducted a preliminary analysis of those data and originally conceived this collaborative study with the second author.

Conflicts of Interest

No conflicts of interest were reported.

References

- Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA School-Age Forms & Profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth, and Families.
- Australian Hearing (2013). *Causes of hearing loss in Australia*. Retrieved from <http://www.hearing.com.au/causes-hearing-loss-australia/>.
- Brown, P. M., Bortoli, A., Remine, M. D., & Othman, B. (2008). Social engagement, attention and competence of preschoolers with hearing loss. *Journal of Research into Special Educational Needs*, 8, 19–26. doi:10.1111/j.1471-3802.2008.00098.x
- Cornes, A. J. (2007). *Development of computer-administered sign language (Auslan) versions of commonly use child mental health instruments and examination of their reliability, validity and acceptability by Australian deaf adolescents* (Unpublished doctoral thesis). Discipline of Psychological Medicine, Faculty of Medicine, University of Sydney, Australia.
- Cornes, A. J., & Brown, P. M. (2012). Mental health of Australian deaf adolescents: An investigation using an Auslan version of the Strengths and Difficulties Questionnaire. *Deafness and Education International*, 14, 161–175. doi:10.1179/1557069X12Y.0000000009
- Cornes, A., Rohan, M. J., Napier, J., & Rey, J. M. (2006). Reading the signs: Impact of signed versus written questionnaires on the prevalence of psychopathology among deaf adolescents. *Australian and New Zealand Journal of Psychiatry*, 40, 665–673. doi:10.1111/j.1440-1614.2006.01866.x
- Fellinger, J., Holzinger, D., Sattel, H., & Laucht, M. (2008). Mental health and quality of life in deaf pupils. *European Child Adolescent Psychiatry*, 17, 414–423. doi:10.1007/s00787-008-0683-y
- Fellinger, J., Holzinger, D., Sattel, H., Laucht, M., & Goldberg, D. (2009). Correlates of mental health disorders among children with hearing impairments. *Developmental Medicine and Child Neurology*, 51, 635–641. doi:10.1111/j.1469-8749.2008.03218.x
- Fellinger, J., Holzinger, D., & Pollard, R. (2012). Mental health of deaf people. *The Lancet*, 379, 1037–1044. doi:10.1016/S0140-6736(11)61143-4.x
- Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A Research Note. *Journal of Child Psychology and Psychiatry*, 38, 581–586. doi:10.1111/j.1469-7610.1997.tb01545.x
- Hintermair, M. (2006). Parental resources, parental stress, and socioemotional development of deaf and hard of hearing children. *Journal of Deaf Studies and Deaf Education*, 11, 493–513. doi:10.1093/deafed/enl005
- Luckner, J. L., & Sebald, A. M. (2013). Promoting self determination of students who are deaf or hard of hearing. *American Annals of the Deaf*, 158, 377–386. doi:10.1353/aad.2013.0024
- Mance, J., & Edwards, L. (2012). Deafness-related self-perceptions and psychological well-being in deaf adolescents with cochlear implants. *Cochlear Implants International*, 13, 93–104. doi:10.1179/1754762811Y.0000000017
- Marschark, M. (1993). *Psychological development of deaf children*. New York, NY: Oxford University Press.
- McCarthy-Jones, S., & Fernyhough, C. (2011). The varieties of inner speech: Links between quality of inner speech and psychopathological variables in a sample of young adults. *Consciousness and Cognition*, 20, 1586–1593. doi:10.1016/j.concog.2011.08.005
- Mejstad, L., Heiling, K., & Svedin, C. G. (2009). Mental health and self-image among deaf and hard of hearing children. *American Annals of the Deaf*, 153, 504–515. doi:10.1353/aad.0.0069
- Moore, D. (2001). *Educating the deaf: Psychology, principles and practices* (5th Ed.). Boston, MA: Houghton Mifflin.
- Roberts, S. B., Brown, P. M., & Rickards, F. W. (1996). Social pretend play entry behaviors of pre-schoolers with and without impaired hearing. *Journal of Early Intervention*, 20, 52–64. doi:10.1177/105381519602000106
- Sawyer, M. G., Arney, F. M., Baghurst, P. A., Clark, J. J., Graetz, B. W., Kosky, R. J., ... Zubrick, S. R. (2001). The mental health of young people in Australia: key findings from the child and adolescent component of the national survey of mental health and well-being. *Australian and New Zealand Journal of Psychiatry*, 35, 806–814. doi:10.1046/j.1440-1614.2001.00964.x
- Scheetz, N.A. (2004). *Psychological aspects of deafness*. Boston, MA: Allyn & Bacon.
- van Eldik, T. (2005). Mental health problems of Dutch youth with hearing loss as shown on the Youth Self Report. *American Annals of the Deaf*, 150, 11–16. doi:10.1353/aad.2005.0024.
- van Eldik, T., Treffers P. D. A., Veerman, J. W., & Verhulst, F. C. (2004). Mental health problems of deaf Dutch children as indicated by parents' responses to the Child Behaviour Checklist. *American Annals of the Deaf*, 148, 390–395. doi:10.1353/aad.2004.0002.
- Van Gent, T., Goedhart, A. W., Hindley, P. A., & Treffers, P. D. A. (2007). Prevalence and correlates of psychopathology in a sample of deaf adolescents. *Journal of Child Psychology and Psychiatry*, 48, 950–958. doi:10.1111/j.1469-7610.2007.01775.x
- Van Gent, T., Goedhart, A. W., & Treffers P. D. A. (2012). Characteristics of children and adolescents in the Dutch national in- and outpatient mental health service for deaf and hard of hearing youth over a period of 15 years. *Research in Developmental Disabilities*, 33, 1333–1342. doi:10.1016/j.ridd.2012.02.012
- Vostanis, P., Hayes, M., Du Feu, M., & Warren, J. (1997). Detection of behavioural and emotional problems in deaf children and adolescents: comparison of two rating scales. *Child Care, Health and Development*, 23, 233–246. doi:10.1111/j.1365-2214.1997.tb00966.x
- Wallis, D., Musselman, C., & MacKay, S. (2004). Hearing mothers and their deaf children: The relationship between early, ongoing mode match and subsequent mental health functioning in adolescence. *Journal of Deaf Studies and Deaf Education*, 9, 2–14. doi:10.1093/deafed/enh014