

**Supporting the Social-Emotional Wellbeing of Elementary School Students who are Deaf or Hard-of-Hearing: A Pilot Study**

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### **Abstract**

**Purpose:** Children who are Deaf or hard of hearing (DHH), their parents, Teachers of the Deaf and other community stakeholders were involved in co-designing a web-based resource to support students' social emotional wellbeing. The resource was designed to provide families and teachers with strategies to enhance the social and emotional wellbeing of Grade 4 to 6 students who are DHH. This study reports outcomes of a pilot study of the web-based resource intervention.

**Method:** A pre-post pilot study was conducted to quantitatively examine reported anxiety, wellbeing, social relationships, school experience, student-teacher relationship, and parent and teacher self-efficacy. A total of 37 students, their parents (n=37) and their classroom teachers (n=40) participated in the intervention program and were provided access to the resource.

**Results:** In total, 19 students, 22 parents and 17 teachers completed both pre- and post- survey measures. Paired t-tests revealed there was a statistically significant increase in parents' self-efficacy scores from pre- to post-test. Multivariate analysis of covariance revealed a significant association between parent use of the website and student-reported improved peer support and reduced school loneliness. No other statistically significant differences were found.

**Conclusions:** The use of web-based resource co-developed with students who are DHH, their parents and teachers could potentially be beneficial for wellbeing of students who are DHH as well as parents' self-efficacy. Further research is needed to confirm the benefits.

**Keywords:** Deaf or hard of hearing; social-emotional development; school experience

### **Supporting the Social-Emotional Wellbeing of Elementary School Students who are Deaf or Hard-of-Hearing: A Pilot Study**

The World Health Organization (2019) reports 34 million children worldwide who are Deaf or hard of hearing (DHH), with hearing loss greater than 40 decibels. Hearing loss varies in nature and is defined by the severity (mild to profound), frequencies impacted (Olsson et al., 2018) and types and causes (e.g., unilateral or bilateral, sensorineural or conductive, congenital or acquired, permanent or transient) (Calcutt et al., 2016; World Health Organization, 2019). Approximately one in one thousand Australian newborns are identified as having permanent hearing loss, increasing to approximately one in five hundred by school age due to acquired causes such as an injury or illness (Brown & Cornes, 2015).

Hearing loss can directly impact an individual's ability to effectively communicate and connect with others (World Health Organization, 2019), thereby affecting social and emotional development and increasing risk for mental health problems (Stevenson et al., 2015). The prevalence of mental health issues related to hearing loss varies across studies, with estimates ranging between 20% - 50% (Dammeyer, 2010), and is difficult to establish due to methodological and heterogeneity amongst DHH population variation (Brown & Cornes, 2015). A Danish study examining the psychosocial wellbeing of 334 children aged 6 to 19 years who were DHH found that 37% presented with psychosocial difficulties, a prevalence rate 3.7 times higher than their non-DHH peers. Notably, children with good sign or oral language abilities did not experience the same high rate of difficulties (Dammeyer, 2010). An Australian study reported that 39% of students who are DHH aged 6 to 18 years experienced mental health issues (Brown & Cornes, 2015), a prevalence rate 2.8 times higher than the general Australian population aged 4 to 17 years (Lawrence et al., 2015). A more recent Australian study found older children and adolescents with hearing loss (12-17 years) experienced an elevated risk of mental health concerns including social phobia, anxiety and emotional difficulties, compared to their peers without hearing issues (Hancock et al., 2017).

Associations have been reported between recurrent episodes of otitis media and associated conductive hearing loss and mental health issues including anxiety or depression (Da Costa et al., 2018; Gouma et al., 2011; Hogan et al., 2014). An Australian longitudinal study reported that children experiencing ongoing ear infections or hearing issues at 4 or 5 years of age are more likely to present with psychosocial concerns in later childhood (Hogan et al., 2014). Importantly, the impacts of communication limitations and challenges are not unique to children who have profound hearing loss, but are also experienced by those with mild to moderate or unilateral hearing loss (Grandpierre et al., 2018). Hence, children who are DHH are at greater risk of experiencing social and emotional challenges regardless of the degree or type of hearing loss (Stevenson et al., 2015).

For children with chronic physical health conditions such as DHH, schools may be a place that provides support against mental health risks, or may exacerbate those risks (Runions et al., 2020) due to experiences such as being the target of bullying (Bouldin et al., 2021). The importance of inclusive education for students with additional needs has been internationally recognised (Xie et al., 2014) with advances in assistive technology, such as cochlear implants, facilitating the inclusion of students who are DHH in mainstream schools (Huber et al., 2015; Schwab et al., 2019). For example, 80% or more of students who are DHH in the USA (Berndsen & Luckner, 2012), Austria (Schwab et al., 2019), Sweden (Olsson et al., 2018), UK (Edmondson & Howe, 2019) and Australia (Davison-Mowle et al., 2018) attend mainstream schools. Just physically placing students who are DHH in mainstream educational settings is unlikely to lead to positive educational and social outcomes, as meaningful peer interaction and acceptance is unlikely to occur automatically (Xie et al., 2014). Instead, these outcomes require active participation and engagement by students, their peers and the wider school community.

Common challenges to the successful inclusion of students who are DHH include their peers' and teachers' limited knowledge about hearing loss, and the classroom teachers' limited skills to support students, such as in managing audiological equipment (Berndsen & Luckner, 2012; Edmondson & Howe, 2019). Limited access to auditory information in the classroom environment

can interfere with both academic learning and social interaction (Edmondson & Howe, 2019; Zaidman-Zait & Dotan, 2017). Even students with adequate spoken language skills are likely to experience communication challenges in group discussions (Punch & Hyde, 2011). Further, regular classroom activities including teacher instruction and social interaction, typically occur at a rapid pace which students who are DHH find challenging (Berndsen & Luckner, 2012).

Adolescents who are DHH may face additional daily stressors due to hearing problems, including feeling self-consciousness about their assistive devices or experiencing difficulties in comprehending rapidly paced conversations with peers (Punch & Hyde, 2011; Zaidman-Zait & Dotan, 2017), resulting in feelings of social isolation (Schwab et al., 2019). Schools need to accommodate the unique needs and experiences of students who are DHH to help ensure positive educational, social and emotional wellbeing outcomes. Most teachers recognise they are integral to facilitating the mental health and wellbeing of their students but lack essential training to provide such support (Kidger et al., 2010). These findings are supported by an Australian study exploring mainstream teachers' perception of their role as facilitators of social emotional development of students who are DHH, that suggested the need for classroom resources for teachers to provide them with strategies and knowledge to support wellbeing of students who are DHH (Furness et al., 2019). Further, students who are DHH may not be able to share their unique experiences with their parents, as the vast majority are born to hearing parents (Zaidman-Zait & Dotan, 2017).

One important concept for research is consumer and community involvement (Boote et al., 2002). The awareness of the importance of consumer and community involvement in research has been growing internationally (Shimmin et al., 2017), as well as in Australia (National Health and Medical Research Council: NHMRC, 2016). Examples of potential positive outcomes of consumer and community involvement include elevated relevance to the needs of consumers and users of the research, improved trust between consumers and researchers and more effective translation of research to practice (Anderst et al., 2020; NHMRC, 2016).

We therefore prioritised consumer and community involvement, and worked in partnership with students who are DHH, their parents/caregivers, professionals who support these students at school and in a community, to address the emotional and social wellbeing of students who are DHH at school. We conducted a multiple-phased, large-scale research project to achieve the following objectives: (a) to determine the needs, strengths and opportunities to support mental health, social and emotional development and school experiences of students who are DHH, (b) co-develop an intervention that enhances the social and emotional development of students who are DHH, and (c) trial the pilot intervention with students who are DHH in mainstream schools, with the ultimate goal of translating the intervention into practice. A series of consultations were conducted during the first two years of the project, involving students who are DHH, Teachers of the Deaf and other professionals who worked with the students at school, parents of these students as well as a variety of community representatives (referred as a Translation Advisory Group, including school-based, audiology and other allied health, education representatives, service providers and associations for students and people who are DHH). Toward these ends, a web-based resource was developed as an intervention to enhance the emotional and social wellbeing of students who are DHH by providing their parents and teachers with strategies to support students' wellbeing.

The current study aimed to examine the outcomes of a pilot study of a co-developed multi-component web resource intervention, on the social and emotional wellbeing of students, and on parent and teacher perceptions of self-efficacy to support students' social and emotional wellbeing. It was hypothesised that students who are DHH would experience reduced anxiety, increased wellbeing, and improved social relationships at school following the intervention.

## **Methods**

### **Ethics**

Approval to conduct this research was obtained from a university Human Research Ethics Committee and two large education bodies that were responsible for approving research in relevant schools in the jurisdiction (name removed for blind review). The project was endorsed by all

participating schools, with written consent from schools, teachers and parents and assent from students required prior to participation.

### **Study Design**

This study employed a pre- and post-intervention design to examine outcomes of the pilot study of the co-developed multi-component intervention resource on the social and emotional wellbeing of students, and on parent and teacher perceptions of self-efficacy.

### **Participants**

#### ***Consumer and Community Consultation Participants***

Consumer and community involvement was conducted as part of the multi-phased research project. Students who are DHH (n=10; Grade 6-7, aged 12-13 years), their parents (n=10), Teachers of the Deaf (n=14), other specialist and allied health staff who were working in a school-based program specialized to support students who are DHH (n=6) participated in consultations embedded in the overarching project. Classroom teachers (n=10) and other mainstream school staff members (n=2) participated in a semi-structured interview. A total of 20 organisations' representatives from DHH community, professional bodies to support DHH (e.g., speech pathology, audiology, government and non-government schools, community health services, Aboriginal health services) also participated in consultations, referred as a Translation Advisory Group, embedded in the multi-phased project.

#### ***Pilot Study Participants***

The pre-post pilot intervention was conducted over 12 months in 2018-2019 in Western Australia. All students enrolled in mainstream schools in Grades 4 to 6 (aged 10-12 years) with mild to profound sensorineural hearing loss (with a severity greater than 20 decibels) were eligible for participation, together with their parents and classroom teachers. This criterion is used by a Commonwealth agency solely responsible for the provision of hearing aids to children who are DHH throughout Australia. Students with low cognitive capacity impeding their ability to complete a survey (as determined by their parent or teacher) were excluded from the study. In total, 37

students aged 10 to 12 years who were DHH, as well as their 37 parents and 40 mainstream teachers who were supporting these students at their schools, participated in the pilot study. One of the students had two teachers who participated and another one had three teachers.

### **Development of the Intervention**

#### ***Consumers and Community Intervention Co-development***

**Student Forum.** Structured workshops similar to a world café method (Fouché & Light, 2011; Schieffer et al., 2004) were held to identify the social emotional needs of students who are DHH. We invited the involvement of students as ambassadors to co-design the intervention. Student ambassadors were guided through an Olympic-themed co-development forum used as part of our overarching research project data collection method. The student ambassadors were split into two groups, built a coaching team and completed four 'Olympic' events each related to the different aspects of their school social environment: (a) Hurdles (jumping the hurdles) - obstacles, challenges and hurdles that students who are DHH need to jump over in Grades 4-6; (b) Shot put (throwing it off) – what helped when things were tough at school; (c) High jump (aim for the sky) - what motivated or encouraged them to go to school; (d) 800m race- going the distance- What helped them be happy and successful at school. The student ambassadors identified and ranked their needs, and brainstormed potential strategies to address the higher priority needs. Finally, the student ambassadors identified and discussed enablers and barriers for success. Following these activities, student ambassadors were invited to develop a 'game plan' as a team to build a prototype solution for a social and emotional issue they chose to prioritise for Grade 4-6 students. Each team presented their ideas to parents and teachers who attended a 'closing ceremony' event.

**Parent Forum.** A parent forum was held concurrently with the student ambassador forum. The topics focused on (a) the social emotional and mental health needs of children who are DHH whilst at school; and (b) strategies to address these needs; (c) parents' role in supporting their children and their school experience; and (d) support needed for parents and caregivers.



**Teachers of the Deaf Workshops.** Two separate workshops were held for school-based professionals working to support students who are DHH: (a) Teachers of the Deaf working at government schools, and; (b) Teachers of the Deaf and other specialist teachers and allied health professionals working in independent schools to support students who are DHH. The following two topics were discussed as a group in these workshops: (a) the needs of students who are DHH whilst at school about their social emotional and mental health; and (b) strategies to address the social and emotional, and mental health priority needs of students who are DHH.

**Classroom teacher and school staff interviews.** Semi-structured interviews were conducted as part of the consultations. The interviews focused on the following: (a) role that school plays in supporting the social emotional wellbeing of students who are DHH; (b) factors that worked well in supporting the social emotional development of students who are DHH; (c) constraints and barriers in supporting students who are DHH; (d) factors that can further enhance skills and abilities of school staff to support students who are DHH; and (e) additional information and resources staff would like to help them support students who are DHH.

**Translation Advisory Group consultations.** A series of meetings were held across three years for the multi-phased project, to provide strategic advice to the project and to ensure translation of findings to the community. Examples of agenda items included: (a) identifying the social emotional and mental health needs of school-age children who are DHH, (b) potential strategies to address priority needs, (c) enablers and barriers of success; (d) resources currently available for social and emotional development for students who are DHH; (e) the proposed intervention – what would work well, missing content; (f) presentation of final intervention resources and review and feedback on the resources; and (g) translation opportunities and dissemination.

### ***Intervention Resources***

As a result of the consumer and community consultations, the need for web-based resources to support the emotional and social wellbeing of students who are DHH was identified and developed. The intervention comprised a website with three components: a student profile, and

parent and teacher portals. Content for each component was developed following findings from the extensive, structured consultations described previously. Consultation data were analyzed and synthesized into a framework (Furness et al., 2019 for classroom teacher data) guided by Bronfenbrenner's (1979) social-ecological model.

To identify content for the intervention resource, a Teachers of the Deaf working group was established with two research partner schools providing educational support to children who are DHH. Further, a social and emotional consultant supported preparation of the resource and curriculum. Resource iterations were finalized following consultation with the working group and consolidated by the research team. A website developer created the online resource. Prior to its release, students who are DHH, their parents, Teachers of the Deaf, classroom teachers and Translation Advisory Group were invited to provide feedback on the content and functionality of the website.

The Student profile section of the web-based resource provided an individualised summary of each student's strengths, needs and preferences. This was adapted from the software that industry partners had already developed that met Australian standards for telecommunications and privacy. Students and parents then decided what information to include in their profiles and what information they would share with their teacher(s) via email or hardcopy.

The parent portal comprised ten information modules, each assisting parents to support their child's social-emotional development within the school setting. These modules were designed for parents to access articles, tips and suggestions relating to the following 10 topics: (a) effective communication skills; (b) bullying prevention; (c) communicating with the school; (d) friendships; (e) social emotional need of children with hearing loss; (f) identity formation and self-image; (g) internet and social media; (h) managing emotions; (i) parent/family communication; and (j) mechanics (i.e., anatomy and physiology) and types of hearing loss. These modules were underpinned by an evidence-based, whole school social and emotional development and bullying prevention program,

(Cross et al., 2012), re-developed based on the data collected and analyzed from the consumer and community consultations described earlier to suit the current project cohort.

The teacher portal comprised articles for teachers as well as student curriculum materials. This portal covered topics such as the impact of hearing loss on social-emotional development and educational outcomes, and included suggestions and tips for classroom teachers. The intervention curriculum, accessed as downloadable lessons and resources, was integrated into the classroom curriculum, intentionally teaching social-emotional skills to all students. The following six modules were provided for teachers of Grade 4 students: (a) we all have emotions; (b) hurt feelings and teasing; (c) empathy; (d) friendship; (e) behaviors that are bullying; and (f) respect and inclusion. For teachers of Grade 5 students, the following six modules were provided: (a) friends and groups; (b) being popular and being a good friend; (c) friends and tricky situations; (d) when it is bullying; (e) why do some people bully; (f) emotional responses. For teachers of Grade 6 students, the following five modules were provided: (a) self-esteem; (b) self-talk; (c) assertiveness; (d) peer influence; (e) bystanders to bullying. The estimate time to complete each module was between 40 and 60 minutes ..

## **Measures**

### ***Anxiety (Student and Parent Report)***

The Spence Children’s Anxiety Scale (SCAS: Spence, 1998) was utilized to measure student anxiety, based on each of child and parent report. Both the child and parent version comprise 18 items (e.g., “I worry about things”; “My child worries about things”) with item responses of *never*, *sometimes*, *often*, and *always*. A mean score of the items in each version was calculated (ranges 1-4). It is reported that the SCAS has excellent psychometric properties (Spence et al., 2003).

### ***Wellbeing (Student Report)***

Two measures of wellbeing were used; student life satisfaction was assessed using five items from the Student Life Satisfaction Scale (SLSS, Huebner, 1991) and overall wellbeing measured using the Cantril Ladder (Levin & Currie, 2014). Responses to the five items from the SLSS (e.g., “My life is

going well”) given on a 5-point scale from *strongly disagree* to *strongly agree* were aggregated into a total score (range 0-20). The shortened version of the SLSS assesses subjective wellbeing with a high level of stability and test-retest validity (Rees et al., 2010).

The Cantril ladder wording of “Here is a picture of a ladder. The top of the ladder ‘9’ is the best possible life for you and the bottom ‘1’ is the worst possible life for you” allowed respondents to indicate where on the ladder they were at that moment. This question is a validated measure of adult wellbeing (Cantril, 1965) and was validated for use with children in the Health Behaviour in School-aged Children study (Levin & Currie, 2014).

### ***Social Relationships (Student Report)***

Three subscales from the Child & Adolescent Social Support Scale (CASSS; Malecki, 2002) were included to measure level of teacher, classmates and close friend support, each comprising 12 items with a 6-point scale: *never, almost never, some of the time, most of the time, almost always* and *always*. A total score was calculated for each subscale (range 12-72). It is reported that the CASSS has excellent internal consistency, test-retest reliability, and validity (Malecki, 2002).

### ***School Experiences (Student Report)***

School satisfaction and loneliness at school were each measured using a 5-point Likert scale (ranging from *strongly disagree* to *strongly agree*). The school satisfaction scale included six items (e.g., “My school is a place where I feel happy”); the loneliness scale included seven items (e.g., “I feel alone at school”). The school satisfaction scale has been used in an Australian based large cohort project that examined wellbeing of Grades 4, 6 and 8 students (Redmond et al., 2016). Responses to the school loneliness scale, adapted from Cassidy and Asher’s 15-item loneliness at school scale (Cassidy & Asher, 1992) have previously been used in school-based bullying studies (Lester et al., 2013; Cross et al., 2018), with good reliability and validity for the abbreviated scale. A mean was calculated for each (ranges 1-5), with higher scores reflecting greater feelings of school satisfaction and loneliness.

### ***Student-Teacher Relationship (Teacher Report)***

The Student-Teacher Relationship Scale (STRS, Pianta, 2001) was completed by teachers to assess the closeness (11 items; e.g., “If upset, this student will seek comfort from me”), conflict (12 items; e.g., “This student and I always seem to be struggling with each other”) and dependency (5 items, e.g., “This student is overly dependent on me”) within the student-teacher relationship. Responses to the items (definitely does not apply, does not really apply, neutral, not sure, applies somewhat and definitely applies) were aggregated into a mean score for the total scale and for each of the three subscales (ranges 1-5). The STRS has excellent reliability and validity and measurement invariance across childhood (Koomen et al., 2012).

### ***Self-Efficacy (Parent and Teacher Report)***

Scales were developed measuring parent and teacher self-efficacy to support children’s social and emotional wellbeing to evaluate the skills and knowledge that the intervention aimed to enhance. Responses to the items were on a 5-point Likert scale (strongly agree to strongly disagree) and a mean was calculated for each scale (range 1-5). The parent scale comprised the following nine items covering self-awareness, self-management, social awareness, and social management: (a) “I am able to have open conversations with my child about problems they may be experiencing at school”; (b) “I am confident to speak up to advocate for my child”; (c) “I have the capacity to teach my child how to speak up for him/herself”; (d) “I feel able to help my child to make new friends”; (e) “I feel able to help my child to strengthen their friendships”; (f) “I have the capacity to build resilience in my child to deal with stress”; (g) “I have the skills to help my child to cope with change”; (h) “I know how to help my child to take action if they feel isolated/lonely”; (i) “I feel able to help my child if they are feeling anxious or sad.”

The teacher scale included seven items, including: (a) “I feel confident to assist parents to support their child’s personal and social development”; (b) “I am able to communicate openly with my DHH student’s Teacher of the Deaf”; (c) “I am able to communicate openly with my DHH student’s parent(s)”; (d) “I am able to teach pragmatic social skills to my DHH student for example, social nuances, social rules and cues, communication and language skills”; (e) “I have the capacity to

help my DHH student connect with other students in the class”; (f) “I feel able to help my DHH student to strengthen their friendships”; (g) “I am able to encourage my DHH student to believe they can do well at school”.

### ***Evaluation of the Web-Resource (Student, Parent and Teacher report)***

Feedback from students, parents and teachers regarding the web-resources was collected via the post surveys. The use of the resource, the usefulness of the resources and suggestions were asked through multiple choice and open-ended questions. Nine question items were included for student users, 17 items for parent users and 19 for teacher users.

### **Recruitment**

Participants were recruited in two rounds based on the educational sector of the school in which they were enrolled, that is, non-government schools (i.e., independent, private or Catholic schools with an independent enrolment process) in Round 1 and public schools (state government schools enrolling students through catchment/intake areas) in Round 2. The families and schools were recruited through the relevant educational sectors and research partners, via invitations to the families and respective schools (approximately 400 students, 298 schools).

All participants were provided with information on the study and informed that participation was voluntary and that they could withdraw at any time without penalty. When administering student surveys, staff provided participants with a card detailing a free children’s counselling service. If answering any survey questions raised feelings of concern, student participants were encouraged to talk to a trusted adult or contact the counselling service provider. Additionally, student participants were provided with information to share with their parents detailing survey participation.

The names of students identified as potentially at risk (a score more than two standard deviations above the mean for anxiety and two below the mean for wellbeing) were provided to their school psychologist who specialised in providing support to children with hearing loss. The psychologist contacted families according to their procedural guidelines. ~~This protocol was actioned~~

for only one child during the study. One student was identified potentially at risk during the study, and this protocol was applied. Consent was obtained from 37 of the approximately 400 eligible students (9.3%).

### **Data Collection**

Australian schools operate on calendar years (Feb-Dec) with the composition of classrooms changing annually. In Round 1, the participants (students, parents and teachers) completed an online pre-survey during Term 3, 2018, accessed the 10-week intervention resource and then completed a post-survey in Term 4, 2018. In Round 2, students and parents completed a pre-survey in Term 4, 2018, then accessed the intervention over the summer break. As the classroom composition changes each new year, Round 2 teachers completed pre-surveys in Term 1, 2019. All Round 2 post-surveys were completed by the end of Term 2, 2019. Each student, parent and teacher were given individual login details to access the intervention resource. Two reminder emails were sent to encourage participants to complete each survey. In addition, one text reminder message was sent to the parent participants. As an incentive to complete the survey, parent participants were offered an opportunity to enter a draw for one of three chances to win an AUD\$100 donation to the charity of their choice. Similarly, teachers were offered an opportunity to enter a draw for their school to win one of three AUD\$100 vouchers at the end of the full set survey completion.

Students confidentially completed online surveys in a quiet room at school assisted by a school staff member following a standardised procedural and verbal protocol. Surveys were also embedded with audio prompts if preferred. An interpreter was available, but not requested by any of the students. Although 37 students completed at least one survey, only 19 students (of the 37 students, 51.4%), 22 parents (59.5%) and 17 teachers (45.9%) completed both pre- and post-surveys. The analyses reported in this paper are therefore based on these samples.

### **Data Analyses**

Each student was given a unique ID code and their respective parent and teacher were given corresponding ID codes to match for the analyses. Firstly, paired t-tests were conducted, comparing the pre- and post-intervention scores for each dependent variable based on student, parent and teacher reports. In the absence of a control group, the extent to which the intervention had an impact, over and above changes from pre- to post-intervention occurring for other reasons, cannot be differentiated. As a pilot study, correction for multiple testing was not undertaken. Hence, testing for differences based on use of the resource using multivariate analyses was undertaken. Given the small sample size it was not feasible to conduct detailed or dose analyses, consequently differences were tested based on parent/teacher use of the website. Multivariate analysis of covariance (MANCOVA) models were applied, that is, modelling the post-score as the dependent variable with the use/non-use indicator variable and pre-score as independent variables. Student-, parent- and teacher-reported student outcomes were modelled on the parents' and teachers' use of the website. Responses of two teachers were removed from this analysis because these tests are based on the assumption of independent observations, requiring only one teacher's data per child. Students' main class teachers' data were used for this analysis. Parent self-efficacy was measured based on parent use, and teacher self-efficacy on teacher use. As parents/teachers were not randomly assigned to website use groups, variations other than their use of the resource could not be controlled and may be present. Hence, differences at pre-test between the use/non-use groups were tested for, but no significant differences on any of the dependent or demographic variables were found. However, having observed that 67% of the parents of boys and only 30% of parents of girls accessed the website, child gender was controlled for in the parent website use analyses. This conservative approach resulted in fewer significant findings compared with MANCOVA models not including gender. All analyses were conducted in SPSS Version 25.

## **Results**

### **Demographic Characteristics of Participants**



**Table 1***Student Demographic Information*

Variable	Value	N	%
Data collection round	Round 1	7	36.8
	Round 2	12	63.2
Gender	Female	10	52.6
	Male	9	47.4
Grade level	Grade 4	9	47.4
	Grade 5	5	26.3
	Grade 6	5	26.3
Family structure	Lives with both parents	14	73.7
	Other arrangement	5	26.3
Number of siblings	None	2	10.5
	One	6	31.6
	Two or more	11	57.9
Languages spoken at home	English only	13	68.4
	English and other spoken language	6	31.6
Indigenous status	Yes	1	5.3
	No	18	94.7
Hearing aid / Cochlear implant	No aid	1	5.3
	Hearing aid – one ear	5	26.3
	Hearing aid – both ears	9	47.3
	Cochlear implant – one ear	1	5.3
	Cochlear implant – both ears	4	21.1
Frequency of use	Never / Sometimes	2	11.1
	All or most of the time	16	88.9
Presence of tinnitus	No	14	73.7
	Yes	5	26.3
Hearing loss impacts on ability to join classroom discussions	No	6	31.6
	Sometimes	11	57.9
	Most of the time	2	10.5
Age hearing loss diagnosed	6 months or younger	7	38.9
	2-5 years	11	61.1
Diagnosis of anxiety disorder	Yes	4	21.1
	No	15	78.9

*Note.* One missing value for age hearing loss diagnosed.

A total of 37 students completed at least one survey. However, only 19 students, 22 parents and 17 teachers completed both pre- and post- surveys. The analyses reported here are therefore based on these samples. The student demographic information (n = 19) is described in Table 1. Approximately a half of the students were female (52.6%) and in Grade 4 (47.4%), while the majority lived with both their parents (73.7%) and with two or more siblings (57.9%). All students nominated spoken language as their preferred mode of communication. About two-thirds were bilaterally fitted with a hearing aid and/or a cochlear implant (68.4%), with 88.9% of students using their hearing devices most or all the time. Based on parent report, seven (38.9%) children were first diagnosed with hearing loss at six months or younger, with the remainder diagnosed between the ages of 2 and 5 years (61.1%). Four children had previously been diagnosed with an anxiety disorder.

The parent sample (n = 22; n=5 from Round 1) were all female. Most parents (n=15, 68.2%) were aged 35-44 years, while five were younger and two parents were older. Most parents (n=14, 63.6%) had a post-secondary education, and a half of these a university degree (n=7, 31.8%). The teacher sample (n = 17; n=6 from Round 1) ranged in age, with six below the age of 35 years, five aged 35-44 years and six aged 45-64 years. There were two male teachers. The majority had six or more years' experience teaching in schools (n=14, 82.4%), and 70.6% had previously taught a student who was DHH (n=12).

### **Pre-Post Comparison of Social and Emotional Wellbeing of Students who are DHH**

Table 2 compares outcome variables between pre- and post- intervention. The students' mean anxiety level reported by themselves and by parents were similar (Pre: 1.86 by students, 1.74 by parents; Post: 1.80 by students, 1.78 by parents). Parent self-efficacy was found to be significantly higher at post-test, compared to the pre-test scores (see Table 2). No other significant pre-post differences were found in the *t*-tests for any of the dependent variables.

**Table 2***Descriptive Statistics and t-test Results Comparing Pre- and Post-test Scores*

	N	Possible range	Pre		Post		t-test	p
			M	SD	M	SD		
<b>Student report</b>								
Anxiety								
SCAS	19	1-4	1.86	0.63	1.80	0.33	0.42	.681
Wellbeing								
Life Satisfaction (SLSS)	19	0-20	13.79	4.23	14.00	4.15	-0.34	.740
Cantril ladder	19	1-9	6.58	2.00	6.58	1.71	0.00	1.00
Social support								
Classmates	18	12-72	46.39	16.98	47.69	15.01	-0.38	.711
Close friend	18	12-72	51.83	17.28	54.67	13.79	-0.86	.402
Teacher	19	12-72	53.37	17.17	53.58	13.60	-0.06	.952
School experience								
School satisfaction	18	1-5	3.77	0.86	3.80	0.83	-0.16	.876
Loneliness at school	17	1-5	2.26	0.99	2.30	1.02	-0.28	.782
<b>Parent report</b>								
Child anxiety	22	1-4	1.74	0.41	1.78	0.39	-0.46	.648
Parent self-efficacy	22	1-5	3.89	0.74	4.11	0.45	-2.15	.044*
<b>Teacher report</b>								
Teacher self-efficacy	16	1-5	4.36	0.44	4.35	0.37	0.11	.917
Student-teacher relationship								
Closeness	17	1-5	4.01	0.28	4.09	0.41	-0.93	.367
Conflict	17	1-5	1.55	0.39	1.56	0.43	-0.08	.936
Dependence	17	1-5	1.88	0.72	1.84	0.66	0.49	.632
Total	17	1-5	4.19	0.32	4.23	0.36	-0.90	.381

*Note.* Some participants skipped some questions.

\*  $p < .05$

405 To examine differences between families who did and did not use the resource, MANCOVA  
406 models were run with post-test values of each of the dependent variables (student, parent and  
407 teacher report) controlling for the pre-test values and child gender (see Table 3). Results based on  
408 the teacher-reported dependent variables by teacher use of the resource are also reported.  
409 Differences across the range of student and parent reported dependent variables based on teacher  
410 resource use was also tested and no significant effects were found. A significant association was  
found between parent use of the website and student-reported peer support ( $p=.048$ , effect  
size=.25) and school loneliness ( $p=.047$ , effect size=.27). In the group of families where the parent  
had accessed the website, the child reported higher levels of peer support at school and less  
loneliness at school compared to the families where the parent had not. No further significant  
associations were found for parent use and no differences were found on any of the student-,  
parent- or teacher-reported variables based on teacher resource use.

<INSERT TABLE 3 ABOUT HERE>

To illustrate the nature of the observed significant associations, mean values for support from classmates and school loneliness broken down by parent use group are given in Table 4. In the small sample of students, average levels of support decreased, and loneliness increased from pre- to post-test for the students whose parents had not used the website, compared to increases in support and decreases in loneliness at school for students whose parents had done so. However, as can be seen in Table 4, differences in means were relatively small. As well, children from families where parents did not access the website scored notably higher in loneliness at pre-test. Furthermore, children from families where parents did not access the website were notably more lonely at the pre-test, indicating pre-existing differences between those families who accessed the website and those who did not.

### **Evaluation of the Web-resource**

**Table 3**

*Analysis of Covariance Models Examining Differences in Outcomes at Post-Test Between Families who Did and Did Not Access the Intervention Resource*

	N	Coeff <sup>a</sup>	SE	t	p	Partial eta <sup>2</sup>	Adjusted R <sup>2</sup>
<b>Student report</b>							
Anxiety	19	-0.231	.162	-1.423	.175	.119	.276
Wellbeing							
Life satisfaction	19	0.930	1.455	0.639	.532	.027	.610
Cantril ladder	19	0.292	.678	0.431	.672	.012	.448
Social support							
Classmates	18	13.109	6.064	2.162	.048*	.250	.440
Close friend	18	7.687	6.110	1.258	.229	.102	.322
Teacher	19	-2.292	7.256	-0.316	.756	.007	.168
School experience							
School satisfaction	18	0.465	.339	1.369	.193	.118	.387
Loneliness at school	17	-0.712	.324	-2.200	.047*	.271	.699
<b>Parent report</b>							
Child anxiety	22	-0.095	.139	-0.688	.500	.026	.362
Parent self-efficacy	22	0.043	.133	0.322	.751	.006	.574
	N	Coeff <sup>b</sup>	SE	t	p	Partial eta <sup>2</sup>	Adjusted R <sup>2</sup>
<b>Teacher report</b>							
Teacher self-efficacy	15	-0.147	.180	-0.821	.428	.053	.397
Student-teacher relationship							
Closeness	15	-0.107	.208	-0.514	.617	.022	.328
Conflict	15	0.267	.139	1.924	.078	.236	.721
Dependence	15	-0.147	.234	-0.629	.541	.032	.667
Total	15	-0.067	.116	-0.575	.576	.027	.732

Note. Coeff: Regression coefficient.

<sup>a</sup> Estimated mean difference for the group of parents who used the website compared to the group that did not, controlling for the pre-test value of the dependent variable and child gender.

<sup>b</sup> Estimated mean difference in group where teacher used the website (vs non-use), controlling for pre-test score. Some participants skipped some questions.

\*  $p < .05$

**Table 4***Means and Standard Deviation for Peer Support and School Loneliness Pre- and Post-Test by Parent**Access of Intervention Website Resource*

	Parent used website	n	Pre		Post	
			M	SD	M	SD
Support from classmates	No	10	41.50	19.67	39.75	14.68
	Yes	8	52.50	11.23	57.63	8.19
Loneliness	No	10	2.59	1.10	2.80	1.00
	Yes	7	1.80	0.64	1.59	0.52

In total, only 13 of the 22 parents (59.1%) and 11 of the 15 teachers (73.3%) who completed pre-post surveys reported making use of the intervention materials via the website, with most participants accessing the website either once or twice. The majority of those who accessed the resource found the information useful (10 of the 13 parents, 76.9%; 10 of the 11 teachers, 90.9%) and most parents (n=9, 69.2%) indicated they followed the suggestions contained therein. Feedback from parents described a lack of time and competing priorities as barriers to uptake. Additionally, some parents felt they were already well-supported. When asked about their motivations to participate, most teachers indicated they were encouraged by school leadership or the consenting family, or they wanted to support the research. Only three teachers indicated they actively engaged with the research to gain knowledge and skills. Similarly, most parents participated to support the research, with one indicating their engagement was to access help for themselves and/or their child.

### **Discussion**

Young people who are DHH are at risk of social and emotional difficulties compared to their peers, and schools and families need to be supported to better address these risks. This study reports on outcomes of the pilot study of the intervention resources for students, parents and teachers to support the social and emotional wellbeing of Grade 4 to 6 students who are DHH. Students who are DHH, classroom teachers, Teachers of the Deaf and relevant community member representatives played a critical role in the development of the web-based intervention resources.

The current study has provided some indication that the intervention materials may help parents of children who are DHH to feel able to support the social-emotional wellbeing of their children. Although the parents' self-efficacy score at pre-intervention was not low, the score was further improved following the resource access. The findings suggest the self-efficacy of parents of children who are DHH could be further improved by providing appropriate information and learning resources. Although it is not possible to establish a causal relationship between the resource access and the improvement in parent self-efficacy, it is an encouraging finding as parent self-efficacy is one

key area for supporting children (Albanese et al, 2019), including those who are DHH (Ambrose et al., 2020).

With regard to direct effects on children's outcomes, there was no statistically significant difference in the level of students' anxiety reported by either students or parents between pre- and post- intervention. Likewise, no significant difference was found in social and emotional wellbeing reported by students who are DHH following access to the intervention resource. Students who participated in this study appear to have a comparable level of social and emotional wellbeing status to their peers in both the pre- and post-test surveys. The reported levels of anxiety on the SCAS were comparable to those of a large Australian sample of Grade 3-6 students ( $n = 8,732$ ;  $M = 1.94$ ,  $SD = 0.53$ ; Rapee et al., 2020) and mean scores for life satisfaction in line with the reported mean of 14.2 for 2,000 children aged 8 to 10 years in the UK (Rees et al., 2010). The students also reported mean levels of social support and school satisfaction towards the upper end of the scales. This suggests that the small sample recruited for this study did not reflect those DHH students who are most at-risk, and this sampling context may have limited the value of the intervention materials for the participants.

Based on the self-report, teachers appear to perceive the relationship with their students who are DHH as being close, with low levels of perceived conflict and dependency. This is an encouraging finding as students who participated in this study appear to have positive school experience. Perceived self-efficacy for teachers who participated in this study was already high at pre-intervention ( $M = 4.36$  on a 1–5-point scale). Likewise, participating parents perceived their self-efficacy score as higher than mid-point ( $M = 3.9$  on a 1–5-point scale). It appears likely that students who participated in this study were already largely well supported by parents and teachers.

Not all parents used the intervention materials. A small but significant association was found between parents' access to the web-based intervention and student-reported peer support and school loneliness. Students from families with at least one parent accessing the learning resource provided as part of the intervention, reported higher levels of peer support and less loneliness at



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school compared to those children whose parents did not access the resource. It is possible the intervention empowered parents to more confidently support their child who is DHH to engage in activities that may lead to more peer group support, potentially reducing their sense of loneliness at school. However, this cannot be determined from this pilot study. For example, the scores at pre-test for peer support were higher for children from families who accessed the resources, and loneliness scores were lower at pre-test. This suggests those families who opted to access the resource may be more proactive about supporting their child, reflected in pre-existing differences in social wellbeing for their children. Randomisation will be a required control for any future evaluations of the intervention as randomisation can minimise any potential confounding factors, and therefore provide a higher level of evidence to support the effectiveness of the resources (Akobeng, 2005).

The completion rates for both pre- and post- surveys were not high for all participant groups, despite the reminders and incentives. The number of teachers who reported their active engagement with the research was also low. Time constraints and competing priorities were reported by parents as barriers to accessing the intervention resources. This is not surprising as clinical appointments with multiple service providers (e.g., audiology, speech pathology) on an ongoing basis may often be required for parents (Harris et al., 2021) to ensure optimal hearing, or communication for their children who are DHH. It is highly likely that teachers experienced a similar challenge, as reported (Furness et al., 2019), and this may have resulted in fewer teachers' active use of the resources due to their workload. Support to reduce the time constraints, for example schools allocating time for teachers to engage with the resources can be one way to improve the positive impact of the resources. Likewise, access to formal and informal support (e.g., access to services that provide seamless, inter-disciplinary support for children who are DHH thus reducing multiple clinical appointments across multiple service providers and help from family social networks, such as friends or relatives affording parents dedicated time to access the resources) may help address the time constraints that may limit parents' access to the resources.

Another possible explanation for the limited use of the intervention resources by some parents and teachers, and the low research participation rates, may be the relatively high self-report efficacy scores. The parents and teachers who participated in the study may have believed that they were already capable of supporting their children's or students' emotional and social wellbeing without accessing the resources. An examination of the effectiveness of the intervention by involving participants who have a lower self-efficacy level would be advantageous in a future study.

Although this pilot study had a small sample size, the positive resource usage outcomes are worth noting. Website traffic analysis of the intervention module on our website indicated an encouraging trend of multiple views by parents within a short period. Based on a review of 290 studies, Poon and Zaidman-Zait (2013) highlighted the multidimensionality of social support requirements for families of children who are DHH and argue interventions must be responsive to and match the needs of parents. The current intervention actively engaged parents of children who are DHH and other key stakeholders in the co-design and development of the web-based resource, asking them via focus groups to identify and prioritise their needs as parents, to inform the content of the resources. Community members are more likely to use research knowledge if the knowledge was co-created with them (Jagosh, et al., 2012; Jull et al., 2017). The web resource developed through this study has been adopted and now disseminated by a community organisation who partnered in this research to enable public access to the resources for children who are DHH and their families (website link removed for blind review). This resource adoption and dissemination suggests the importance of this issue for community members who are affected by hearing loss, highlighting the need for further and more extensive research to help families whose children are DHH.

### **Limitations**

This was an uncontrolled pilot study, and the absence of a control group complicates the interpretation of the findings, making it impossible to establish causal relationships between the intervention and the changes following the intervention. The small sample size available for the

hypothesis testing limited the generalisability of the findings beyond the observed sample. There was some indication the sample were biased toward more well-functioning, well-adjusted participants, further limiting our capacity to draw conclusions about efficacy with children with higher needs. We also cannot exclude the possibility that significant effects may be due to random chance, given the number of tests conducted: given the nature of this pilot study, statistical correction was not applied to the statistical testing, and the observed significant difference may have occurred by chance. This intervention needs to be tested using a larger, more representative sample with random allocation to condition to assess its impact. Involving a large number of children with DHH and their families as participants in research can, however, be a challenge.

Lastly, the number of views of the web resource and the low research participation rate suggest there may be barriers to parents accessing the resource. Qualitative examinations of participant feedback will help to explore barriers and facilitators for accessing the resource.

### **Conclusion**

Students who are DHH are at risk of poor social and emotional wellbeing and mental health difficulties. Parents and teachers would benefit from improving their knowledge and strategies to support children who may experience these risks. The intervention was co-developed with children who are DHH, their families and stakeholders to ensure a user-friendly, ecologically valid intervention approach. This pilot study found some potential benefits, relating to students' levels of peer support and loneliness as well as parents' self-efficacy, from the web-based intervention resource involving students who are DHH and their families and teachers, albeit the results relate to a small cohort sample.

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