Social-emotional factors underlying internalizing problems and peer relations in deaf or hard of hearing youth

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Chapter 3

Somatic complaints in children and adolescents who are deaf or hard of hearing

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Abstract

Frequent somatic complaints are not only a problem in themselves but also related to other difficulties. So far, no conclusive findings have been reported about the prevalence of and factors underlying these complaints in children and adolescents who are deaf or hard of hearing (DHH). Such information would be valuable for prevention and intervention. Therefore, the aim of this study was to examine the prevalence of somatic complaints and their relation with emotional functioning in DHH youngsters, as compared with hearing youngsters. This was established by assessing how somatic complaints, mood states, and sense of coherence were experienced by 186 Dutch participants (mean age = 11;07 years). DHH and hearing groups were compared using multivariate analysis of variance and structural equation modeling. The results showed that somatic complaints were reported equally often for both groups, but that the pathways leading to these complaints were partly different. Only in DHH participants were feelings of fear associated with more somatic complaints. The results suggest that DHH children and adolescents would benefit from support in the regulation of fear and its causes. Other aspects affecting adjustment outcomes of DHH youngsters were education type and communication mode.

3 Introduction

Despite the fact that many people who are deaf or hard of hearing (DHH) have no other physiological problems than this sensory loss, they run a higher risk of developing mental health problems than hearing people. Various internalizing problems, such as somatic complaints (e.g., headache, stomach ache, and dizziness), depression, or anxiety, are more often observed in DHH adolescents than in hearing adolescents (Fellinger, Holzinger, Sattel, Laucht, & Goldberg, 2009; Konuk, Erdogan, Atik, Ugur, & Simsekyilmaz, 2006; Van Eldik, 2005). It has been found that internalizing problems in hearing youth are predicted by emotional functioning (cf. Zeman, Shipman, & Suveg, 2002). In particular, problems in emotion regulation and dealing with daily stressors have been identified as important factors underlying the development of internalizing symptoms such as somatic complaints (Campo, Bridge, Ehmann, Altman, Lucas, Birmaher, & Brent, 2004; Jellesma, Rieffe, Meerum Terwogt, & Westenberg, 2011; Torsheim, Aaroe, & Wold, 2001).

Besides somatic complaints being a problem in themselves, they are also associated with increased social isolation and academic difficulties because these children frequently miss out on school and other school-related social activities (Campo, Jansen-McWilliams, Comer, & Kelleher, 1999; Torsheim et al., 2001). For DHH children, absence from school can be even more unfortunate because this group already is more likely to have to repeat a grade than hearing children (Bess, Dodd-Murphy, & Parker, 1998). The question now is whether the same factors that in hearing children and adolescents have been identified as contributing to the development of somatic complaints also apply to DHH children and adolescents. Therefore, the aim of our study was to examine the prevalence of somatic complaints and their associations with emotional functioning in DHH children and adolescents, as compared with hearing children and adolescents.

Emotional functioning in children who are DHH

In general, DHH children appear to have difficulties in the domain of emotional functioning (cf. Hosie, Russell, Gray, Scott, Hunter, Banks, & Macauley, 2000; Rieffe, 2012). These emotional difficulties could be associated with limited access to communicative exchanges, as more than 96% of DHH children grow up in hearing families (Mitchell & Karchmer, 2004). Communicative exchanges are an important factor in learning about emotions; hearing children whose

parents regularly discuss emotions with them have been found to demonstrate a more complex understanding of emotions than children whose parents do not regularly discuss emotions (cf. Denham, Renwick-DeBardi, & Hewes, 1994). In this respect, the key factor does not appear to be the modality of communication (sign, sign supported, or spoken) but rather whether DHH children share a similar communication mode with their parents (cf. Christiansen & Leigh, 2004; Wallis, Musselman, & MacKay, 2004). This is supported by the fact that regarding developmental timelines and milestones, deaf children born of deaf parents are on a par with hearing children born of hearing parents (cf. Courtin, 2000; Peterson & Siegal, 1995; Petitto, 2000). In addition to communicative exchanges between family members and the children themselves, overhearing others is also an important aspect of learning about emotions. DHH children cannot 'accidentally overhear' conversations of others, which affects the scope of daily learning opportunities about emotions and in turn could cause emotional difficulties.

For example, there are problems in the emotion regulation strategies of DHH children. It should be kept in mind that this implies to a subset of DHH children and not the full DHH population. Yet, a significant subset does experience emotion regulation difficulties; for example, these children analyze a situation less thoroughly than hearing children. DHH children acknowledge only one emotion when multiple emotions could be experienced (Rieffe, Meerum Terwogt, & Smit, 2003). Furthermore, their range of coping strategies is limited (Rieffe, 2012), and they relatively often neglect factors that can influence strategy effectiveness, such as the controllability of a situation (Rieffe et al., 2003). When a situation is not totally hopeless (i.e., more controllable), an anger response is usually strategically appropriate because anger is aimed at changing the situation for the better. This implies a healthy and constructive anger response, such as to express and explain the angry feelings in a controlled confrontational manner. Yet, in case of a less controllable situation, it is more productive to focus on the outcome of the negative situation instead of the cause and come to terms with the damage incurred. This coming to terms with the damage incurred is associated with a feeling of sadness (Stein & Trabasso, 1989). DHH children were found to report sadness more often than anger in daily stress situations, irrespective of the controllability of the situation (Rieffe et al., 2003). Their focus on the undesired negative outcome and the additional feelings of sadness could make them feel unable to influence situations for the better (Siemer, Mauss,

& Gross, 2007); in other words, it may make them feel they lack control in their daily lives.

Other studies found that when DHH children do express anger, they often express this in a maladaptive manner. DHH children expressed their anger more openly than hearing children (Hosie et al., 2000). Additionally, DHH children did not try to explain the anguish they felt to the children who were hurting them (Rieffe & Meerum Terwogt, 2006). Ineffective use of negative emotions (besides anger, this pertains also to other negative emotions) can result in less reduction of the intensity of the negative emotions; the negative emotions are prolonged, which can cause negative moods. Negative mood states, in turn, are aspects that have frequently been found to be associated with the experience of somatic complaints in typical development (Campo, Bridge, Ehmann, Altman, Lucas, Birmaher, & Brent 2004; Meerum Terwogt, Rieffe, Miers, Jellesma, & Tolland, 2006; Rieffe, Meerum Terwogt, & Bosch, 2004).

Emotional functioning and somatic complaints

The link between somatic complaints (e.g., headache, stomach ache, and dizziness) and various negative moods has been explained by the fact that emotions have a physiological component (Mayne, 1999). Emotional reactions evoke physiological changes, such as increased heart and breathing rates and muscle tension. These physiological changes are essential for the adaptive behavior that the emotion is intended to achieve. For example, in case of anger, the aim is to defeat the opponent or stop the opponent from causing further harm (Frijda, 1986). However, when an individual does not adequately react to a negative emotion-evoking situation (in a cognitive or behavioral manner), the emotion and its physiological component linger and long-term negative mood states arise (Scherer, 2000). These moods can intensify and prolong the bodily stress reactions, which in the long run can lead to somatic complaints (cf. Segerstrom & Miller, 2004).

Additionally, people's level of so-called 'sense of coherence' (SoC, i.e., how competent people feel in dealing with everyday stress situations) has been an important factor in explaining the development of somatic complaints (Jellesma, Rieffe, Meerum Terwogt, & Kneepkens, 2006; Torsheim et al., 2001). SoC refers to the affective appraisal component of daily life situations, that is, it reflects the extent to which children understand the meaning of life situations, make sense of them, and control them (Antonovsky, 1993). SoC differs from constructs

that bear conceptual resemblance, for instance internal locus of control, in that SoC is universally meaningful. Thus, the term does not refer to specific strategy types but to factors that always and in all cultures form the basis for successful dealing with daily stressors. Previous studies have found associations between SoC and health in typically developing children (Jellesma et al., 2011; Torsheim et al., 2001); we refer to those studies for more detailed information regarding the exact basis of this association. What is relevant in the current context is that children with a low sense of coherence have been found to report more somatic complaints whereas higher levels of situational control are associated with fewer somatic complaints.

To sum up, in typical development both negative affect and SoC have been found to be associated with somatic complaints. In DHH children, these emotional functioning variables are generally thought to be affected in comparison to hearing children, that is, higher levels of negative moods and lower levels of SoC. Can these forms of emotional functioning predict the high levels of somatic complaints reported for DHH children and adolescents?

Somatic complaints in children who are DHH

These high levels of somatic complaints in DHH children have been found in self-report studies (Kent, 2003; Van Eldik, 2005). Yet, when parents were the informants, the results were not conclusive; some studies found that DHH children experience more somatic complaints than hearing children (Konuk et al., 2006) whereas others failed to find this difference (Van Eldik, Treffers, Veerman, & Verhulst, 2004). Underdiagnosis of somatic complaints has also been found in research on hearing children when their parents were the informants (Meesters, Muris, Ghys, Reumerman, & Rooijmans, 2003). Underdiagnosis can be an even bigger issue in DHH children, due to communication barriers between them and their generally hearing parents (Connolly, 2006).

There is an aspect that should be specifically considered in research on the DHH group: the heterogeneity of this group. Heterogeneity can be found in, for example, degree of hearing loss, preferred mode of communication (sign, sign supported, or spoken), type of schooling, and type of hearing aids. With respect to school placement, most studies on the prevalence of somatic complaints include either children in special schools (Konuk et al., 2006; Van Eldik et al., 2004) or children in regular education (Kent, 2003). However, Van Eldik (2005) included both groups, and found that the children at special

schools for the deaf and hard of hearing score significantly higher on somatic complaints than children in regular education. Concerning heterogeneity in hearing aids, children who derive little or no benefit from conventional hearing aids nowadays receive cochlear implants (CI). The number of CIs in young children has increased rapidly over the past two decades, and the effect of this hearing device on psychosocial areas of adjustment is a controversial issue. Overall, the psychological (e.g., feeling good about oneself, feelings of loneliness, ability to control tension and anxiety) and social functioning (e.g., interaction with peers) of children with a CI is suggested to lie somewhere between that of children with regular hearing aids and hearing children, but results and conclusions vary considerably (Bat-Chava, Martin, & Kosciw, 2005; Dammeyer, 2010; Huber, 2005; Khan, Edwards, & Langdon, 2005). Regarding the influence of the type of hearing aid on specific somatic complaints, no known studies have been carried out thus far. Additionally, no known studies have been conducted on the association between mode of communication and somatic complaints. Mode of communication has been studied with respect to its association with psychopathology in general, a connection that has been supported by some studies (Van Gent, Goedhart, Hindley, & Treffers, 2007; Vostanis, 1997) but not in others (Hindley, Hill, McGuigan, & Kitson, 1994; Polat, 2003). Other studies support the notion that it is not communication mode as such, but a match in communication between children and their social surroundings that affects mental health (cf. Wallis et al., 2004). However, because it is still unclear whether the use of sign or sign supported language, or spoken language is associated with variability in psychological outcomes, communication mode is a variable that should not be neglected in psychological research on DHH children.

Purpose of study

To date, conclusive knowledge about the occurrence of somatic complaints and the factors underlying these in DHH children and adolescents is scarce. The aim of our study was twofold. The first was to examine whether DHH children and adolescents experience more somatic complaints than hearing children and adolescents. Most studies on internalizing symptoms in DHH children are based on parent-reports, whereas it could be argued that because of the possible communication difficulties between these children and their hearing parents, the best sources of information are the children themselves. Therefore, our study is based on children's self-reports about their somatic complaints. On the basis of past research findings

on children's self-reports (Kent, 2003; Van Eldik, 2005), we predicted that DHH participants would report more somatic complaints than hearing participants. Additionally, the differences in prevalence between subsamples of the group of DHH participants (CI vs. regular hearing aids, mainstream vs. special education, and sign or sign supported vs. spoken communication) were explored. Given not only the small body of literature but also conflicting results, no specific predictions could be formulated with respect to differences between the subsamples based on type of hearing aid or communication mode. However, concerning education type, we expected children and adolescents in special education to report more somatic complaints than mainstreamed children and adolescents, in line with past results of Van Eldik (2005).

The second aim of this study was to examine two aspects of emotional functioning that could be important for understanding the development of somatic complaints in DHH children and adolescents. Affective mood state and feelings of control over daily situations are related to somatic complaints in hearing youngsters. In this study, we examined the extent to which these relations also apply to DHH youngsters and hence focused on the moderating effect of group membership (i.e., DHH vs. hearing) on the relations between affective mood state and SoC on the one hand and somatic complaints on the other. These relations were established through regression analyzes. The analysis framework chosen here was multigroup structural equation modeling (SEM), as this allows statistical testing of the differences of regression parameters between groups (Bollen, 1989). Although we expected DHH participants to have a reduced SoC and elevated levels of negative mood states, there is no clear reason to expect the relations between these predictor variables and somatic complaints to be different in DHH children and adolescents than in hearing populations. The theory that problems in the emotional domain are associated with somatic complaints should also account for complaints reported for DHH children and adolescents; however, there is no clear empirical evidence for this, and that is what we tried to find by our experiment.

Method

The topic of this article is part of a larger research project in which multiple aspects of the social and emotional development of DHH children and adolescents are

explored. The Medical Ethics Committee of the Leiden University Medical Center granted permission for the research.

Participants

A total of 186 children and adolescents participated in the study, of which 73 were DHH participants. Inclusion criteria for the DHH participants were (a) significant hearing losses in both ears of at least 40 dB in the best ear, which were calculated by averaging unaided hearing thresholds at 500, 1000, and 2000 Hertz; (b) detected with hearing loss prelingually or perilingually; and (c) to not have any medical or developmental disabilities such as mental retardation or autism spectrum disorder. All children were born into hearing families, except for one child, whose parents both were deaf.

A control group of hearing children and adolescents were recruited from primary and secondary regular schools in the Netherlands. These schools were randomly selected, although it was ensured that these schools were a proper reflection of the Dutch educational system. Schools that agreed upon participation sent information packages to the parents, who in turn sent a signed consent form to the research group. Exclusion criteria for the control group were identical to the DHH group (i.e., no diagnosed disabilities). The control group matched with the DHH children regarding age, socioeconomic status (measured by net income per year, job, and highest education of both parents), ethnicity, and two subtests to measure nonverbal intelligence. Table 1 provides specific details about both groups. This information was obtained from both parental questionnaires and medical records.

Materials

The questionnaires used in the present study were self-reports and addressed somatic complaints, mood (sadness, fear, anger, and happiness), and sense of coherence. All participants viewed the items one at a time in written Dutch on a laptop. Beneath each item were three response buttons on which the participants could click with a computer mouse. After an answer was given, the next item appeared automatically. DHH participants proficient in sign or sign supported language watched a short movie with a sign language version of the item, in addition to the written Dutch version. These short sign language movies could be replayed as many times as the participant desired. A qualified sign language interpreter did translation from Dutch into sign language. Subsequently, the

items were videotaped, signed by either a deaf individual or a sign language interpreter. Back translation did not show discrepancy between translated and original items.

Table 1 *Characteristics of (subsamples of) participants*

	Total sample (N = 186)	
	DHH	**Hearing**
Number of children - *n*	73	113
Age mean in years (*SD*)	12;01 (1;08)	11;08 (1;04)
Age range in years	9;05-15;08	9;01-14;08
Sex - *n* (%)		
Male	37 (51%)	50 (45%)
Female	36 (49%)	63 (55%)
Degree of hearing loss [a]- *n* (%)		
Moderate (40-60 dB)	20 (27.5%)	
Severe (61-90 dB)	19 (26%)	
Profound (91-120 dB)	25 (34%)	
Unknown	9 (12.5%)	
Preferred mode of communication - *n* (%)		
Oral language only	49 (67%)	
Sign supported Dutch	22 (30%)	
Sign language	2 (3%)	
Type of education - *n* (%)		
Regular education	43 (59%)	
Special education	30 (41%)	
Type of amplification - *n* (%)		
Hearing aid (of which 1 BAHA[b])	48 (66%)	
Cochlear Implant	25 (34%)	

[a] Degree of hearing loss was calculated by averaging unaided hearing thresholds at 500, 1000, and 2000 Hertz.
[b] BAHA = Bone Anchored Hearing Aid.

Before actual data collection began, participants were assured that their responses would be processed anonymously. In addition, they were informed that clarifications on any item or question could be asked of the researcher. Subsequently, they were made familiar with the testing procedure by an introduction and sample questions.

The *Somatic Complaint List* (SCL; Jellesma, Rieffe, & Meerum Terwogt, 2007; Rieffe et al., 2004) consists of 11 items. This list was developed in order to identify how often children and adolescents experience various forms of pain and other bodily complaints, such as dizziness, stomach ache, and headache. Children rate the frequency with which they experience these complaints on a 3-point scale

(1 = *never*, 2 = *sometimes*, and 3 = *often*). Two of the items are positively formulated and thus reversely scored.

The *Mood Questionnaire* (Rieffe et al., 2004) comprises four mood scales (three negative: anger, sadness, and fear; one positive: happiness). These four scales contain a total of 17 items (anger, sadness, and fear: four items each; happiness: five items), which were expanded by three additional positive filler items to compensate for the overrepresentation of negative items. Children are asked "How have you been feeling the past four weeks?" as an introduction to the items and instructed to score each item on a 3-point scale (1 = [*almost*] *never*, 2 = *sometimes*, and 3 = *often*). Example items are "I feel afraid" (fear scale), "I am furious" (anger scale), "I feel sad" (sadness scale), and "I feel happy" (happiness scale).

Sense of Coherence refers to an individual's view of the world as meaningful and predictable. The original version of this scale consists of 13 items (Antonovsky, 1993; translated by Torsheim et al., 2001). In the present study an adapted and shortened version of six items was used to make data collection less demanding for participants. Based on a pilot study with 474 children and adolescents, these six items were found to be core items that strongly represent sense of coherence. The external validity of the shortened version was checked, and comparisons were made between correlations of the full questionnaire and the shortened questionnaire with related measures, such as depression, anxiety, and self-esteem (Eriksson & Lindström, 2005). Both the full and the shortened versions were significantly correlated with these measures, with similar correlation coefficients (i.e., $r = 2.29$ vs. $r = 2.30$, $r = 2.60$ vs. $r = 2.60$, and $r = .34$ vs. $r = .30$ for depression, social anxiety, and self-esteem, respectively). The reliability coefficient of the shortened version in the pilot was $\alpha = .74$. Internal consistency depends on number of participants in the sample and number of items per scale (Nunnally, 1978), which explains the lower albeit still adequate internal consistency of our shorter scale in the current study. Adaptations were made in formulations and/or length of the items in order to make them more comprehensible for DHH children given their possible language difficulties. For example, the item "How often do you have feelings that you are not sure you can keep under control?" was adapted into "I cannot keep my feelings under control." The participants were asked to score the items on a 3-point scale (1 = *never*, 2 = *sometimes*, and 3 = *often*).

The *nonverbal intelligence* of the children was assessed with two subtests of the Wechsler intelligence scale for children-Third Edition (WISC-III): Block

Design (copying small geometric designs with cubes) and Picture Arrangement (sequencing pictures to make logical stories; Kort, Schittekatte, Compaan, Bosmans, Bleichrodt, Vermeir, & Verhaeghe, 2002; Wechsler, 1991). For seven DHH and 15 hearing children, there were missing data on both IQ subtests. All questionnaires had internal consistencies ranging from sufficient to good, as shown in Table 2. In addition, internal consistencies of the sign language versions and spoken language versions were also calculated separately. These were found to be sufficient to good, taken into account the small samples and few items per scale, except for the Fear mood due to its low incidence (Nunnally, 1978).

Table 2 *Psychometric properties of questionnaires*

	No. of items	Range	Alpha		Means (*SD*)	
			DHH	H	DHH	H
Somatic complaints	11	1-3	.82	.83	1.42 (.35)	1.48 (.35)
Mood						
Sadness	4	1-3	.77	.82	1.41 (.46)	1.36 (.39)
Fear	4	1-3	.69	.80	1.31 (.43)	1.29 (.37)
Anger	4	1-3	.83	.79	1.41 (.43)	1.40 (.39)
Happiness	5	1-3	.76	.85	2.83 (.31)	2.74 (.35)
Sense of Coherence	6	1-3	.70	.65	2.29 (.37)	2.24 (.36)

Abbreviations. DHH = deaf or hard of hearing; H = hearing

Procedure

In total, 27 schools for the deaf and hard of hearing and four ambulatory care organizations (that is, health care services that are provided on an outpatient basis) for DHH children and their families were asked to participate in the present study. Twelve schools refused to participate for several reasons (e.g., not only a lack of children who met the criteria for the sample but also concerns about the potential time commitment for both the school and children and ongoing research projects). Two schools and one ambulant care organization did not respond at all, but 13 schools and three organizations agreed to participate in the study. These special schools were not mainstream programs that included both DHH and typically developing hearing students. Furthermore, these schools had a bilingual teaching philosophy in which students were educated in spoken language supported by sign and sign language. In line with privacy policy, information packages and consent forms were sent to the parent(s) of the children via these schools and organizations. Following receipt of completed

and signed consent forms, the schools or parents were contacted to set a date for data collection.

Participants (both DHH and hearing) were individually tested at school or at home in two sessions ranging from 30 min to 1 hr, with approximately one week in between. The researchers communicated with the participants in their preferred mode of communication.

Statistical Analyzes

For the comparison of DHH youngsters and hearing youngsters on the prevalence of somatic complaints, the levels of the four affective mood states (fear, happiness, anger, and sadness), and sense of coherence, a multivariate analysis of variance (MANOVA) was carried out. In addition, a MANOVA was conducted to compare the three subgroups of DHH children and adolescents (i.e., CI vs. regular hearing aids, sign or sign supported language vs. spoken language, and regular vs. special education) on the aspects of emotional functioning. In this latter analysis, the three main effects (i.e., hearing device, language mode, and education type) were explored, when there was a correction for the remaining two main effects. Version 19.0 of the *Statistical Packages for the Social Sciences program* (SPSS) was used.

The relations between the emotional functioning variables and somatic complaints were established by means of regression analyzes, in which somatic complaints was the dependent variable and aspects of emotional functioning were the independent variables. As important as the strength of the relations are the differences in these relations between the two groups. These possible group differences were tested by means of SEM, part of the statistical software package of LISREL (Jöreskog & Van Thillo, 1972). In this approach, first a model is tested with equality restrictions on all regression parameters of the two groups, that is, the matrices of regression parameters contain exactly the same values for the two groups. Model fit can be evaluated by means of the chi-square test and several fit indices such as the root means square error of approximation (RMSEA). If the test statistic reaches significance, the null hypothesis of equal regression parameters must be rejected. If this model fit is rejected, univariate tests of specific parameter in variance (the so-called modification indices) can be used to identify the group differences in regression weights. If the two sets of regression parameters are indeed found to differ, group membership has a moderating effect on the relation between the variables (Bollen, 1989).

Results

DHH vs. hearing participants on somatic complaints, affective mood states, and SoC

The first research question entailed establishing whether DHH children and adolescents have a higher prevalence of Somatic Complaints in comparison to a sample of hearing children and adolescents. Overall the group of DHH participants did not report a higher prevalence of Somatic Complaints than hearing participants, $M = 1.49$, $SD = 0.36$ vs. $M = 1.42$, $SD = 0.35$; $F(1,184) = 1.80$, $p = .18$. Furthermore, no group differences were found on any of the four affective mood states or sense of coherence.

However, differences between the DHH and hearing group are found in correlations between the four affective mood states. In Table 3, it can be seen that Happiness and Fear, and Happiness and Sadness are unrelated in the DHH group.

Table 3 *Correlations between mood scales for the DHH and hearing groups separately*

	Sadness	Fear	Anger	Happiness
Sadness		.58***	.50***	-.23
Fear	.57***		.34**	-.03
Anger	.22*	.23*		-.34**
Happiness	-.52***	-.46***	-.28**	

Note. Above the diagonal the DHH group and below the hearing group
* $p < .05$, ** $p < .01$, *** $p < .001$

Differences between subgroups of DHH participants

In-depth analysis of the group of DHH children and adolescents revealed that participants using Sign or sign supported language reported higher levels of Fear mood in comparison to participants using only Spoken language, $M = 1.49$, $SD = 0.52$ versus $M = 1.20$, $SD = 0.24$; $F(1,69) = 8.79$, $p < .01$; partial $\eta^2 = .113$. In addition, students in Special education report less Happiness mood than students attending Mainstream education, $M = 2.63$, $SD = 0.39$ versus $M = 2.84$, $SD = 0.27$; $F(1,69) = 4.78$, $p < .05$; partial $\eta^2 = .065$. These differences could not be explained by variability in degree of hearing loss, as this variable was not found to be related to any of the variables. No other differences between subgroups of DHH participants have been found on the variables examined in the current study.

Table 4 *Correlations and regression coefficients*

	DHH	Hearing	Total sample			DHH	Hearing
Variables	Pearson Correlations		R^2_{adj}	*B*	R^2_{adj}	*B*	*B*
			49%		51%		
Age				.02			
Gender				.07			
Mood							
Sadness	.49***	.67***		.23***			
Fear	.50***	.50***		.10		.21**	.01
Anger	.40***	.34***		.10*			
Happiness	-.34**	-.66***		-.28***		-.19*	-.43***
SoC	-.49***	-.38***		-.17**			

Abbreviation. SoC = Sense of Coherence

* $p < .05$, ** $p < .01$, *** $p < .001$

Emotional functioning predicting somatic complaints

The second research question entailed establishing which emotional functioning variables are associated with and predicted the prevalence of Somatic Complaints. The Pearson correlation analyzes (see Table 4) revealed that all negative moods (i.e., Fear, Sadness, and Anger) were positively associated with Somatic Complaints. In contrast, the positive mood Happiness was negatively associated with Somatic Complaints. Sense of Coherence (SoC) was found to be negatively linked to Somatic Complaints. No major differences between DHH participants and hearing participants on these correlations were found. In addition, correlational analyzes between Age and all variables were conducted for the DHH and hearing groups separately. No significant relations were found. Yet, group differences were found after carrying out the multigroup analysis in which the regression model of Somatic Complaints on the four affective Mood scales and SoC was fitted with equality constraints on all parameters. The chi-square reached significance ($\chi^2 = 72.43$, degree of freedom = 36, $p < .001$), and also other measures showed poor fit (RMSEA = 0.11; Goodness of Fit Index = .89) suggesting inequality. The rejection of the null hypothesis and the poor values of the fit measures indicate that there are differences in the parameters between the two groups. The largest decrease in chi-square value could be accomplished (as determined from the modification indices) by removing the equality restrictions in the regression of Somatic Complaints on Fear mood and Happiness mood. When these equality restrictions were removed, the regression coefficients indicated a stronger negative contribution of Happiness mood on Somatic

Complaints in the hearing group than in the DHH group. In addition, Fear mood only contributes positively to Somatic Complaints in the DHH group, whereas this does not contribute to Somatic Complaints in the hearing group. Concerning contribution of feelings of control on Somatic Complaints, no group differences were found between DHH participants and hearing participants. Finally, Age and Gender were not found to make a significant contribution to somatic complaints.

Discussion

In this study, we explored the occurrences of and factors underlying somatic complaints in (subsamples of) a group of children and adolescents who are DHH. Regarding the prevalence of somatic complaints in DHH youngsters as compared with hearing youngsters, previous findings of more self-reported somatic complaints in DHH than in hearing populations (Kent, 2003; Van Eldik, 2005) could not be confirmed. This discrepancy could have to do with the methodology used to assess somatic complaints. In our study, we used a well-validated questionnaire to examine exclusively the experience of somatic complaints (SCL; Jellesma et al., 2007). In previous studies, assessment of somatic complaints was part of larger questionnaires assessing health behavior or child behavior in general, such as the Health Behavior in School-aged Children questionnaire (Kent, 2003) or the Youth Self-Report (Van Eldik, 2005). In addition, these questionnaires had larger reference periods than the four weeks of the SCL, covering two months (Youth Self-Report) or even six months (Health Behavior in School-aged Children questionnaire). In general, the more complex the recall task, the less reliable the reporting (Brener, Billy, & Grady, 2003). Finally, we found dissimilarities between these somatic complaints scales and the questionnaire used in our study regarding the particular physical complaints that were assessed. To find out whether certain physical complaints are experienced especially by DHH children and in turn cause differences between DHH and hearing children, future research should assess somatic complaints by using a one-dimensional questionnaire including a variety of physical complaints.

When we considered the subsamples of DHH participants, it appeared that children and adolescents using sign or sign supported language reported more fear than children and adolescents using spoken language. It should be mentioned here that the group using sign or sign supported language included

only two children who used sign language. So, these results pertain particularly to children using sign supported language, and caution should be taken in generalizing to native speakers of sign language. In addition, results showed that students in special education reported less happiness than students in regular schools. The findings for these groups defined by education type and language mode are obviously interrelated because only 3 out of 43 individuals in mainstream schools used sign supported language, compared with 22 out of 30 individuals in the special schools who did so. One might be tempted to conclude that special schools and sign supported language hamper DHH youngsters in their development. However, it should be noted that students attending mainstream schools are those that do very well given their hearing loss (Van Gent et al., 2007) and are expected by professionals to be able to fit in and perform well academically and socially. In contrast, children with various problems could increasingly populate special education schools. It is not the education type that appears to be the essential factor but rather the special characteristics of the students attending a certain form of education.

Besides analyzing subsamples based on education type and language mode, we also explored differences between children and adolescents with CI and with regular hearing aids. What benefits children may derive from their CI is an especially controversial topic nowadays, and thus far the results on psychosocial functioning have not been unequivocal. Our results indicate that youngsters who received a CI did not differ from youngsters with regular hearing aids (or the hearing youngsters) regarding the prevalence of somatic complaints nor any of the other variables. It is important to note that the group of children and adolescents with CI that took part in the present study was relatively small, with 25 participants; more firm conclusions could be drawn on a larger sample.

Contrary to expectation, sense of coherence was the same for DHH and hearing youngsters and for the various DHH subsamples. On the basis of previous work, in which deaf children had been found to take less notice of causal factors leading to a negative event but instead stayed focused on the desired outcome (Meerum Terwogt & Rieffe, 2004), we had expected DHH children to feel less in control over situations. However, this was not confirmed in our sample. It is possible that DHH children use different strategies than hearing children to communicate and negotiate within their social environment. Perhaps, DHH children's tendency to focus excessively on the desired outcome (Rieffe & Meerum Terwogt, 2000) is not the result of ignorance regarding causal

factors in the situation but a deliberate strategy that works best in a hearing environment with which they share limited means of communication. This alternative explanation is supported by a recent study in which deaf children have shown that they understand the difference between situations for which someone could be held responsible, and situations in which this was not the case (Rieffe, 2012). Future studies could look into this issue more closely because of its relevance for professionals working with DHH individuals.

Our second main question related to the extent to which mood states and sense of coherence were associated with somatic complaints and to what extent group membership (DHH or hearing) would moderate these relations. For both groups, all variables correlated in the expected directions: negative mood states correlated positively with somatic complaints, and this was reversed for happiness and sense of coherence. Moreover, sadness, anger, and happiness, and the participants' sense of coherence predicted somatic complaints, and the explained variance of this model was high. These significant contributions confirmed our expectations and were consistent with the literature (Jellesma et al., 2006, 2011; Rieffe, 2012; Torsheim et al., 2001).

In contrast, our finding that feelings of fear did not uniquely contribute to the prediction of somatic complaints was unexpected and inconsistent with the literature (Jellesma et al., 2006), despite its high correlation with somatic complaints in both groups. Fear was measured by asking children how frequently within the past four weeks they had, for instance, been afraid or experienced a situation as scary. The exact role played by feelings of fear was clarified by examining the moderating effect of group in the regression model. Outcome measures showed that, despite the high correlation between fear and somatic complaints, fear did not uniquely contribute to the prediction of somatic complaints for hearing children and adolescents. Yet, in DHH children and adolescents, fear did uniquely contribute to such a prediction, over and above the other mood states and sense of coherence. In contrast, the contribution of feelings of happiness was much stronger in the hearing group than in the DHH group.

These differences between the groups make sense when the bivariate correlations are considered. Even though in both groups the correlations between fear and somatic complaints were high in absolute terms (.50), it was high for the DHH group only in relation to correlations between the other mood states and somatic complaints. In the hearing group, however, the correlations among sadness, happiness, and somatic complaints (.67 and -.66, respectively) were very high

and took so much variance, there could be no unique contribution of fear. In addition, the relations between the mood states themselves show that in the hearing group more happiness is related to less sadness and less fear, whereas these significant interrelations are not found in the DHH group. This indicates that in hearing children, more happiness goes hand in hand with less sadness and less fear. In the DHH group, happiness and fear are less entangled, so that each has a unique contribution to somatic complaints. These relations not only between mood and somatic complaints but also between the mood states themselves explain the more dominant role of fear and the less dominant role of happiness in the regression model for the DHH group as opposed to that of the hearing group. In other words, in the development of somatic complaints, fear might play a more influential role for DHH children than for hearing children, whereas happiness might be a stronger protective factor for hearing than for DHH children. Yet, happiness is still a protective factor in the DHH group, and the association between happiness and somatic complaints in both the DHH and the hearing group corresponds to the findings reported in past literature (Jellesma et al., 2006). The mean scores on the variables showed no differences between the groups, but note that the relations underlying these variables and predicting somatic complaints do differ.

The fact that in the DHH group fear is closely related to somatic complaints may mean that this emotion is especially difficult for DHH children and adolescents to deal with. We can only speculate as to the cause of this difficulty. Perhaps, DHH children and adolescents experience feelings of fear due to the fact that they are living in a hearing society to which they have to make adjustments (e.g., regarding interaction) that can generate feelings of fear (Li & Prevat, 2010). Alternatively, one could argue that DHH children and adolescents could have fears that they do not want to share with others, possibly out of shame or perhaps because they do not want to be different from their hearing peers. These possible explanations should be addressed in a follow-up study.

Additionally, a follow-up study could have a longitudinal design, in order to confirm the assumptions about causality we made here. Furthermore, even though sample sizes were respectable, especially regarding the DHH group, the DHH sample size in our study was unfortunately still too small to compare the different subgroups with respect to the regression models. In future studies, this comparison could be realized by having larger subsamples. It is especially important to have more native speakers of sign language, as these

are a significant group within the DHH population. Additionally, in future studies, the influence of various characteristics of the DHH group on emotional development could be taken into account more explicitly, such as sense of Deaf identity, degree of specialist support received by DHH children in mainstream education, or decision of educational provision. Another aspect that could be examined further is which specific features of communication are associated with the emotional difficulties DHH children experience. Some previous results point to a lack in conversational depth or detail (Lederberg & Everhart, 2000; Preisler, Tvingstedt, & Ahlström, 2002). Yet, the question whether this is indeed associated with emotional difficulties needs to be clarified in future research.

A strength of our study was the sufficient to good psychometric properties of the questionnaires used. This is especially remarkable when we take into account the relatively small number of participants and items, and the fact that not only some adaptations were made but also translations into sign language for part of the DHH sample. The only exception was that fear feelings assessed from the DHH children who use the spoken language mode showed low reliability. More in-depth analyzes revealed a floor effect in the boy's sample within this group. Boys are often found to report absence of fear (Rieffe, Meerum Terwogt, & Kotronopoulou, 2007), which could be explained by the social prejudice that boys should be unafraid.

Finally, we would like to briefly discuss the findings of this study in the light of practical relevance, that is, its possible contribution to the prevention of somatic complaints and the adjustment of existing intervention programs. Intervention programs for DHH children and adolescents who are experiencing somatic complaints should focus on their feelings of fear, establishing the sources of their fears and finding out what would be the best approach in terms of support to reduce these feelings. To conclude, merely comparing DHH and hearing youngsters on outcome variables may not give full insight into group differences regarding psychological functioning because the pathways leading to the outcome variables may differ.