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Research Paper

MALTESE CHILDREN WITH A HEARING IMPAIRMENT: ANALYSIS OF THE CURRENT SITUATION AND ITS IMPACT ON THE QUALITY OF LIFE OF PARENTS

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Abstract. Understanding the effect that a diagnosis of a childhood hearing loss has on parents would help professionals adopt an approach which diminishes parents' possible negative feelings and concerns. A sample of parents of children with hearing impairment was interviewed to document demographic data related to hearing loss in Maltese children. The present study also attempted to analyse the effect of hearing loss on the parents' wellbeing. Parents of 23 children with a hearing loss and parents of eight children without a hearing loss participated in the study. Structured face-to-face interviews were carried out with both groups of parents. A self-devised questionnaire was used with parents of children with hearing impairment to collect information about several factors related to the hearing loss. This included documentation of the different types, degrees and causes of hearing loss as well as the ages of suspicion, diagnosis and amplification of children with a hearing loss. The World Health Organisation Quality of Life-BREF (WHOQOL-BREF) questionnaire (World Health Organisation [WHO], 1998) was then used with both groups of parents to obtain a quality of life profile in four domains: physical health, psychological health, social relationships and environment. Slight quality of life differences, which were not statistically significant, were noticed between parents of children with a hearing loss and parents of children without a hearing loss. Quality of life scores were marginally higher for parents whose gap between the day of diagnosis and the interview date was more than 24 months, when compared to parents whose gap was 24 months or less. These findings extend the limited data on the effect of hearing loss on parents' quality of life in the Maltese context. More intensive support may be indicated for parents of children with hearing impairment, particularly in the initial stages following a diagnosis of a hearing loss. Support would help parents better understand and accept their child's hearing impairment.

Keywords: hearing impairment, hearing loss, quality of life, parents, children, Malta

1 Introduction

Hearing loss is a partial or total inability to hear. It is the most common sensory impairment, which considerably increases with age (World Health Organistion [WHO] & The World Bank, 2011). It is estimated that 360 million people worldwide have a disabling hearing loss, of which 32 million (9%) are children (WHO, 2013). Hearing loss is believed to be more common in boys than in girls. In fact, the Gallaudet Research Institute (2011) reports a male to female ratio of 1.2:1. From their literature review, Stevens et al. (2013) found that the global prevalence of hearing loss (with an average hearing level of 35 dB or more in the better ear) was 1.4% for children aged five to 14 years, 9.8% for females older than 15 years and 12.2% for males older than 15 years. Moreover, Hille, van Straaten and Verkerk (2007) report a prevalence of 3.2% in neonatal intensive care units. The latest census on the Maltese population revealed that 5,673 (0.01%) of the census respondents felt that they were not able to hear clearly, of whom 46 were younger than 10 years of age and 108 were aged from 10 to 19 years (National Statistics Office, 2014).

Childhood hearing loss can result in an impaired ability to communicate, inadequate language acquisition leading to inability to interpret speech sounds, economic and educational disadvantages and social isolation (Stevens et al., 2013). Furthermore, individuals with a hearing loss may be at a social disadvantage in both developing and developed countries (Olusanya, Ruben & Parving, 2006). Untreated hearing loss may also have an emotional impact on the individual with a hearing impairment (Garstecki & Erler, 2009).

Several types of hearing loss have been identified. In 1999, Grech collected data from 76 (81%) of the 94 hearing impaired individuals who received a service from the Special Education Department in Malta and Gozo. The sample population included data from 46 boys and 30 girls aged between 1;11 and 17;10 years. From her parental interviews, the author found that 70 (92%) of the subjects had a bilateral loss, while six (8%) suffered from a unilateral loss. Furthermore, 50 subjects (66%) had a congenital loss while 15 subjects (20%) had an acquired loss. Parents of 11 (14%) subjects were uncertain whether the loss was congenital or acquired.

Diefendorf (2009) states that 50% of the cases of congenital sensorineural hearing loss have a genetic cause, with 70% of these being non-syndromic and the remaining 30% being associated with particular syndromes. Diefendorf adds that the other 50% of cases of congenital sensorineural hearing loss have an environmental cause, with the following being the most common: bacterial infections, viral infections, ototoxic antibiotics, environmental toxins, physical trauma and acoustic trauma. A considerable number of hearing loss cases are of unknown aetiology. In fact, the Gallaudet Research Institute (2011) found that the aetiology of the hearing loss was not known in 57.8% of their sample.

When describing a hearing loss, it is also important to describe the extent of the severity of the loss. The degree of hearing loss affects speech production and spoken language outcomes (Sininger, Grimes & Christensen, 2010). Grech (1999) explained that although information about the degree of hearing loss collected from her local sample may have been subjective, in most cases parents acknowledged a substantial degree of loss.

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Ozcebe, Sevinc and Belgin (2005) carried out research in Turkey on children with severe to profound hearing loss whose hearing was not screened at birth and found that the mean ages of suspicion, diagnosis and amplification were 12.5, 19.4 and 26.5 months respectively. Similarly, Jafari, Malayeri & Ashayeri's (2007) study on children with profound hearing impairment revealed that the mean ages of suspicion, diagnosis and amplification were 12.6, 15.2 and 20.5 months respectively. A study on the Maltese population showed that only 6.1% of the individuals reported to have a congenital hearing loss were diagnosed by six months of age. Moreover, 75.5% of the subjects were identified after one and a half years of age, with more than half of the sample being identified beyond three years of age (Grech, 1999).

There is currently a lack of data on the demographics of Maltese children with a hearing loss. The current study takes a parental perspective to document the types, degrees and causes of hearing loss as well as the ages of suspicion, diagnosis and amplification in Maltese children. This study also aims to understand the effect that a hearing loss may have on the parents' quality of life (QOL).

1.1 The effect of the child's hearing loss on the family

A diagnosis of hearing loss does not only affect the individual with hearing impairment but would possibly affect the QOL of the entire family. In their study, Mitchell and Karchmer (2004) found that 92% of children with hearing impairment are born to hearing parents. This means that the majority of parents have little or no experience of hearing loss. In fact, the presence of a child with hearing impairment in a hearing family may be a cause of family stress (Moores, Jatho & Dunn, 2001) and it may have a drastic impact on all the areas of family life, with several factors influencing the degree and type of impact (Jackson & Turnbull, 2004). Childhood hearing loss may influence multiple dimensions of family life including the child, other family members, and their participation in the community (Jackson, Traub & Turnbull, 2008). A diagnosis of a hearing loss may also affect the QOL of the extended family. Grandparents, for example, may experience disappointment, grief and loss as a result of a diagnosis of hearing loss in their grandchildren (Morton, 2000).

1.1.1 Age of diagnosis of hearing loss

Late diagnosis of a hearing loss may have an even more negative effect on the family. In fact, Young and Tattersall (2007) found that an overwhelming majority of parents whose children were diagnosed early were positive about the fact that the hearing loss was identified early, regardless of the degree of the loss. Frustrations and negative family experiences associated with a later diagnosis may be attenuated or prevented with early identification and early intervention (Jackson, Wegner & Turnbull, 2010). Since newborn hearing screening reduces the age at which infants with hearing impairment are diagnosed and treated, it would, in turn, improve the quality of parents' and infants' life (Canale et al., 2006). However, even though parents clearly support knowing early, early knowledge may bring emotions of grief and distress (Young & Tattersall, 2007). Knowing early may put pressure on parents to perform within a timetable in order for their child not to lose any of the advantages of early intervention. Parents of children with hearing impairment face important decisions, including the type of assistive technology which the child may benefit from and the communication modality that may be chosen for the child. Support for parents of children with hearing impairment is crucial in order for parents to be able to make informed decisions about their child's future.

1.1.2 The way in which diagnosis is reported

Breaking bad news is a difficult task for professionals since people may react differently to a diagnosis of hearing loss. Indeed, parents perceive the time immediately after the diagnosis as detrimental to their QOL (Burger et al., 2005). Jackson, Traub and Turnbull (2008) reveal that feelings reported by parents whose children were diagnosed with a hearing loss included shock, fear and uncertainty about the future, denial and indifference. Planning and implementation of effective strategies for breaking bad news should be an integral part of universal newborn screening programmes (Gilbey, 2010). Grech's (1999) research on the parents of 76 Maltese children with hearing impairment showed that 18.4% of the parents felt that the diagnosis was reported too quickly, while 10.52% felt that they were given no support immediately after the diagnosis. Other parents felt that the way in which the diagnosis was reported was cold and lengthy, with no explanation given.

1.1.3 Change in stress and quality of life (QOL) with time

The wellbeing of families of children with hearing impairment may change with time. Lederberg and Golbach (2002) found that when children with hearing impairment were 22 months old, there was a significant difference between stress levels of their mothers and those of mothers of same-age children with typical hearing, whilst there was no significant difference when the children were three and four years old. Burger et al. (2005) revealed that, with time, there was an improvement in the QOL of both parents of children who received cochlear implants and parents of children who were fitted with hearing aids. The median age of the children who used hearing aids in this study was 28.8 months whilst the median age of children who used cochlear implants was 29.1 months. Burger et al. believe that the process of adjustment to the child's hearing loss and the improvement in language development are important influential factors of the QOL of parents.

Meinzen-Derr et al. (2008) found that, following a diagnosis of hearing loss, carers' stress related to emotional wellbeing and health care decreases with time, whilst stress related to educational aspects increases with time. Family stress following a cochlear implantation may not decrease with time, as a result of the high expectations parents have at the beginning of the implantation and rehabilitation processes, and since parents' attitudes may become less positive with time (Weisel, Most & Michael, 2007).

1.1.4 Support for families of children with hearing impairment

Appropriate support for families of children with hearing impairment may reduce the negative effects of permanent hearing loss (Fitzpatrick et al., 2008). Parents who are informed bluntly of an existing hearing loss and who are not given support may feel helpless and frustrated (Gilbey, 2010). One of the recurring themes reported by parents of children with hearing impairment was the importance of parent support groups and the need for social networks with other parents (Jackson, Wegner & Turnbull, 2010). Professionals need to be attuned to the needs of the extended-family members. Morton (2000) believes that grandparents of deaf children may benefit from support groups which would help them express their negative feelings. Further examination of the impact of deafness on family members may assist clinicians in providing family-centred support following identification of a hearing loss. Providing information and support to the parents would in turn enhance the children's language acquisition and educational achievement following diagnosis of a hearing loss (Kushalnagar et al., 2010).

Grech's (1999) study showed that counselling was recommended for 34% of the families which, in most cases, was provided by teachers of the hearing impaired. Grech reported that family support groups are helpful in supporting parents of children with hearing impairment. Spiteri et al. (2004) insist that there needs to be more support for parents and professionals working with deaf children in Malta. There are no official support groups for parents of children with hearing impairment in this country. However the Malta Cochlear Implant Association offers such support (D. Camilleri, personal communication, June 3, 2015). The Deaf People Association (Malta) also gives support to parents of

children with a hearing loss (A. Vere, personal communication, January 22, 2014).

The following research questions were addressed in the current study:

- What are the different types, degrees and causes of hearing loss among children in Malta?
- What are the ages of suspicion, diagnosis and amplification of children with hearing impairment in Malta?
- What feelings did the diagnosis of a hearing loss evoke in parents and would parents have benefitted from more counselling and support?
- Is there a significant difference between the QOL of parents whose children use hearings aids, the QOL of parents whose children use cochlear implants and the QOL of parents of children without a hearing loss?
- How does time after diagnosis of a hearing loss affect the QOL of parents?

2 Methods

2.1 Research design

In the attempt to answer the research questions, a mixed research approach was used in this study. A convergent parallel mixed method design allowed the merging of quantitative and qualitative data to provide a comprehensive demographic overview of hearing loss in Maltese children, as well as parental QOL as reported by the parents themselves (Creswell, 2014). Quantitative data was obtained through close-ended questions whilst qualitative data was gathered through open-ended questions.

Various methods for data collection were considered, including postal questionnaires, internet questionnaires, self-administered questionnaires and face-to-face interviews. The face-to-face interview approach was chosen because this enables the interviewer to clarify questions and to encourage participation and involvement of the respondents (Robson, 2011). This approach is the best for making use of open-ended questions, as it enables the interviewer to build a better rapport with the interviewee and to have more control over the response situation (Czaja & Blair, 2005). Interviews were audio recorded in order for the researcher to be able to analyse the parents' exact responses.

2.2 Participants

Two different samples were required for this study. Sample A included 23 mothers and 16 fathers of 23 children with a hearing loss aged between 0 and 6;11 years, with a mean age of 4;10 years (SD = 20.25). Thirteen children (57%) were males and 10 (43%) were females. Participants were recruited through the Audiology Department of the state general hospital of Malta. Parents of 27 children with hearing impairment who use the state general hospital services were first approached by the audiologist of the hospital. Parents of 23 children (85%) accepted to participate in the study. Two questionnaires, described in Sections 2.3.1 and 2.3.2, were used with these parents.

Sample B served as a small control group and included eight mothers and seven fathers of eight children without a hearing loss, aged between 0 and 6;11 years, with a mean age of 4;10 years (SD = 17.18). Gender of the children was equally distributed in the sample. Participants of Sample B were randomly recruited from community parent and child groups. These parents were approached by the president of these groups. The parents were then contacted by the researcher for an appointment to be set up. The Milestones of Development Checklist (Childsupport, 2007) was used with the parents who accepted to participate in the study. Parents of all eight children stated that, to their knowledge, their children were typically-developing. All parents reported that their children achieved more than 90% of the milestones expected according to their chronological age. Hence, all eight children were considered as being within the range of typical development (Dosman, Andrews & Goulden, 2012). Subsequently, the hearing of each child was tested under the guidance and supervision of a qualified audiologist. The audiologist confirmed that all eight children had a hearing level within the normal range. The researcher then interviewed the parents using Questionnaire 2, which is described below.

2.3 Research tools

Two different questionnaires and a checklist were used in this study. Below is a description of these research tools.

2.3.1 Questionnaire 1: Evaluation of factors related to children with hearing impairment and their parents

This questionnaire, which consists of 26 questions, was formulated following an extensive literature review (Gilbey, 2010; Grech, 1999; Jafari, Malayeri & Ashayeri, 2007; Lederberg & Golbach, 2002; Meinzen-Derr et al., 2008), and highlights various factors related to hearing loss (Table 1). Questionnaire 1 was devised in English and later translated to the Maltese language. This questionnaire included a variety of close-ended and open-ended questions in order to obtain more comprehensive responses from the parents of children with hearing impairment.

Table 1. Themes analysed in Questionnaire 1

Questions	Themes analysed
1-4	Type of hearing loss Degree of hearing loss Cause of hearing loss Presence of any additional impairments
5-23	Factors related to suspicion of hearing loss Factors related to identification of hearing loss Factors related to the amplification device used
24-26	Availability of resources and counselling Modes of communication used with the hearing impaired child

2.3.2 Questionnaire 2: The World Health Organisation Quality of Life-BREF (WHOQOL-BREF)

A number of QOL questionnaires were considered including the Adult Carer Quality of Life Questionnaire (Elwick et al., 2010), the Second European Quality of Life Survey Overview (European Foundation for the Improvement of Living and Working Conditions, 2009) and the World Health Organisation Quality of Life-BREF (WHOQOL-BREF) (WHO, 1998). The WHOQOL-BREF was considered to be the best tool to obtain QOL scores from the parents of both groups. This questionnaire assesses persons' perceptions of their position in life in the context of the culture and value system where they live, in relation to their goals, expectations, standards and concerns (WHO, 1998). This questionnaire consists of 26 items which include two questions on the overall perceived QOL and satisfaction with health, followed by 24 items which are based on four different domains: physical health, psychological health, social relationships and environment (Table 2). The WHOQOL-BREF has good to excellent psychometric properties of reliability and performs well in preliminary tests of validity (Skevington, Lotfy & O'Connell, 2004). All items were rated on a 5-point Likert-form scale with a higher score indicating a higher QOL. Scores for each domain were transformed to a common 4-20 scale in order to facilitate the interpretation of results (WHO, 1996). The WHOQOL-BREF was interview-administered in order to avoid problems concerning the understanding of questions. Questionnaires with more than 20% of the

data left unanswered (or one item in the three-item social domain) were discarded (as suggested by WHO, 1996). Permission to use the English and Maltese versions of the WHOQOL-BREF was sought and granted by the WHO.

Table 2. Domains of the WHOQOL-BREF

Domains	Facets incorporated within domains
Physical Health	Activities of daily living
	Dependence on medicinal substances and medical aids
	Energy and fatigue
	Mobility
	Pain and discomfort
	Sleep and rest
	Work capacity
Psychological	Bodily image and appearance
	Negative feelings
	Positive feelings
	Self-esteem
	Spirituality / Religion / Personal beliefs
	Thinking, learning, memory and concentration
Social relationships	Personal relationships
	Social support
	Sexual activity
Environment	Financial resources
	Freedom, physical safety and security
	Health and social care: accessibility and quality
	Home environment
	Opportunities for acquiring new information and skills
	Participation in and opportunities for recreation / leisure activities
	Physical environment (pollution / noise / traffic / climate)
	Transport

2.3.3 Milestones of Development Checklist

The Milestones of Development Checklist, proposed by Childsupport (2007), was used in this study to document the children's stage of development in different aspects, including cognitive, motor, socio-emotional, and speech and language, from their parents' perspective. This checklist was only used with the control group, in order to reduce the possibility of including parents of children who were not following typical developmental stages. Children who achieved more than 90% of the milestones expected according to their chronological age were considered as being within the range of typical development. High-quality evidence suggest that the 90th percentile criterion can quickly identify typical versus atypical development (Dosman, Andrews & Goulden, 2012).

2.4 Ethical considerations

The study was approved by the University of Malta's Research Ethics Committee (proposal number 035/2013). Confidentiality was assured to all participants. Before meeting with parents of samples A and B, the respective parents were provided with a recruitment letter detailing all the necessary information about the study and about participation. Consent forms were signed by each parent who was willing to participate in the study. Participants had the right to withdraw their consent from the study at any time without penalty, even after the interview was finished.

3 Results and Discussion

3.1 Type, aetiology and degree of hearing loss

The results presented in Table 3 reveal the types of hearing loss reported by the parents. Twenty subjects (87%) were reported as having a sensorineural hearing loss[1] which was stable, while three (13%) were reported as having a mixed hearing loss[2] which was fluctuating. Parents of 19 children (83%) stated that the hearing loss was bilateral, while parents of four children (17%) reported a unilateral loss. Fifteen subjects (65%) were reported as having a congenital loss. In eight subjects (35%), parents were uncertain whether the loss was congenital or acquired. In 15 subjects (65%), a sudden loss was reported while parents of eight children (35%) were uncertain whether the loss was sudden or progressive. Table 4 displays the degree of hearing loss in the left and right ear of the children with hearing loss as reported by parents. The vast majority of subjects in this study were reported as having a hearing loss which ranged from moderately severe to profound. This may imply that a number of children with milder losses may not have been identified or may have used audiological services from the private sector. The lack of a neonatal hearing screening programme may be one of the reasons why children with mild losses are missed (Grech, 1999).

Table 3. Type of hearing loss

Type of hearing loss	*N*	%
Stable	20	87
Fluctuating	3	13
Bilateral	19	83
Unilateral	4	17
Congenital	15	65
Uncertain whether congenital or acquired	8	35
Sudden	15	65
Uncertain whether sudden or progressive	8	35

Note. N = frequency; % = percentage

Table 4. Degree of hearing loss

Degree of hearing loss	*N*	%
Normal	0	0
Slight	0	0
Mild	2	9
Moderate	2	9
Moderately severe	4	17
Severe	2	9
Profound	13	57

Note. N = frequency; % = percentage; guidelines proposed by the British Society of Audiology (2011) were used to calculate the average hearing level

Figure 1 summarises the reported causes of hearing loss. None of the parents reported rubella as being the cause of their child's hearing loss. This contrasts with data for congenital hearing loss in Malta, published in 1999, where 21% of the subjects reported that contracting rubella was the cause of their child's hearing loss (Grech, 1999). Primary prevention strategies such as increased awareness and immunisation against this disease may be the reason for the decline in the number of hearing losses caused by rubella.

1 A sensorineural hearing loss can be either cochlear, or more rarely, retrocochlear (Busacco, 2010)

2 A mixed hearing loss is a loss that has both sensorineural and conductive elements (Busacco, 2010)

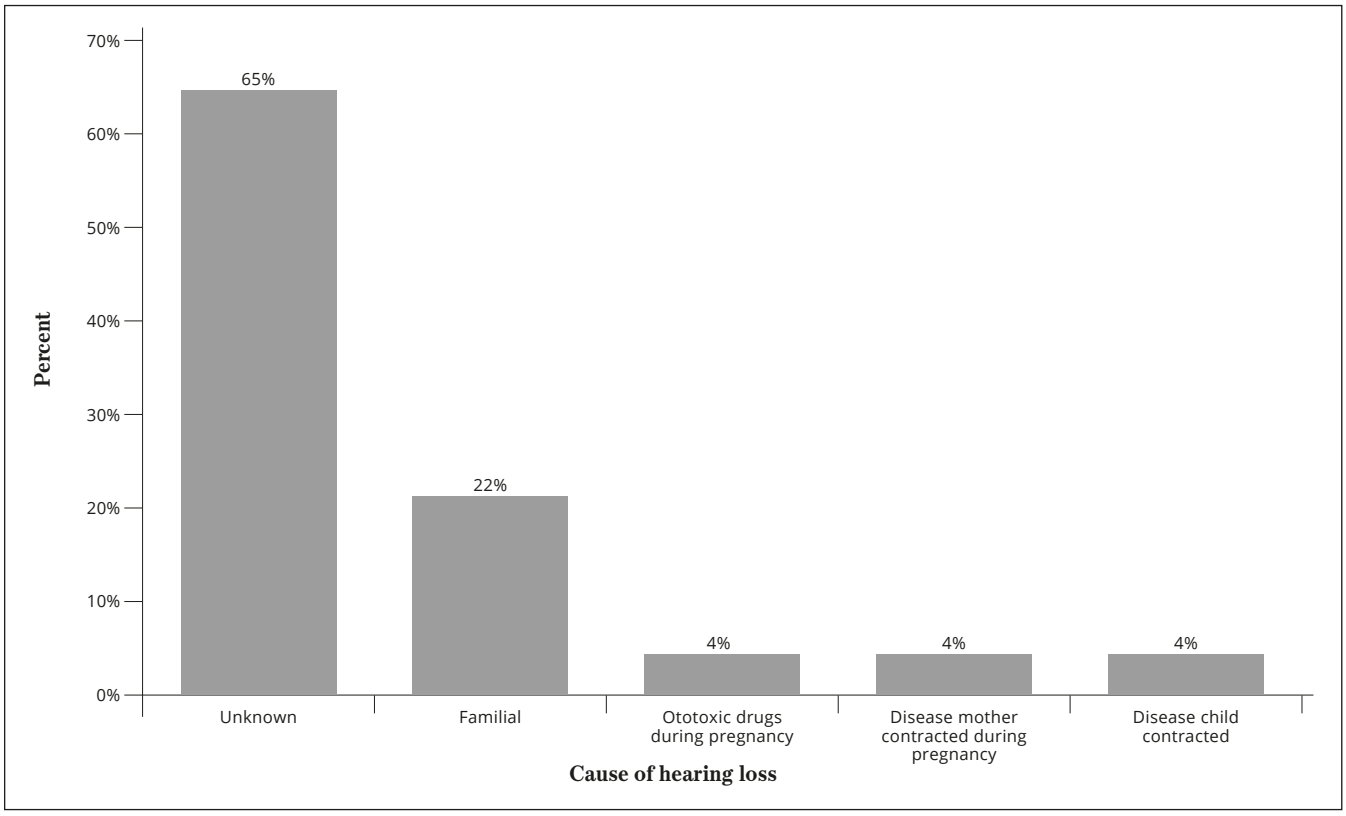

Figure 1. Cause of hearing loss

3.2 Suspicion, diagnosis and amplification of children with hearing impairment

Figure 2 shows an error bar graph of the mean ages of suspicion, diagnosis and amplification, as reported by parents. The mean gap between suspicion and diagnosis of a hearing loss was 6.00 months (SD = 5.43) while the mean gap between diagnosis and amplification was 3.22 months (SD = 3.55).

Hearing loss was suspected in the first year of life in nine subjects (39%). Similar to other studies (e.g. Grech, 1999; Harrison & Roush, 1996; Jafari, Malayeri & Ashayeri, 2007), the current study reveals that in the majority of the cases (70%), it was the parents or other family members who suspected the hearing loss. Parental reports from this study reveal that five subjects (22%) were diagnosed within the first year of life, while only three subjects (13%) received amplification devices by the time they reached one year. Furthermore, 10 subjects (43%) were diagnosed and received their first amplification after three years of age. From her study on the Maltese population, Grech (1999) found that 53% of children with hearing loss were diagnosed beyond the third year of age. Sharma, Dorman and Spahr (2002) argue that the brain has the highest plasticity in the first three and a half years of age, making this a critical window for language learning. Language learning has a critical period since infants and young children have a greater ability to learn language when compared to adults (Bruer, 2008). Humphries et al. (2012) emphasise that if children are not exposed to a natural language during early childhood, they might never be completely fluent in any language. It is evident that a considerable number of children with hearing impairment did not receive their amplification during the period in which language experiences can best contribute to optimal language development. There is currently no national newborn hearing screening programme in Malta and Gozo. However, the fact that children who receive intensive care have their hearing screened is a

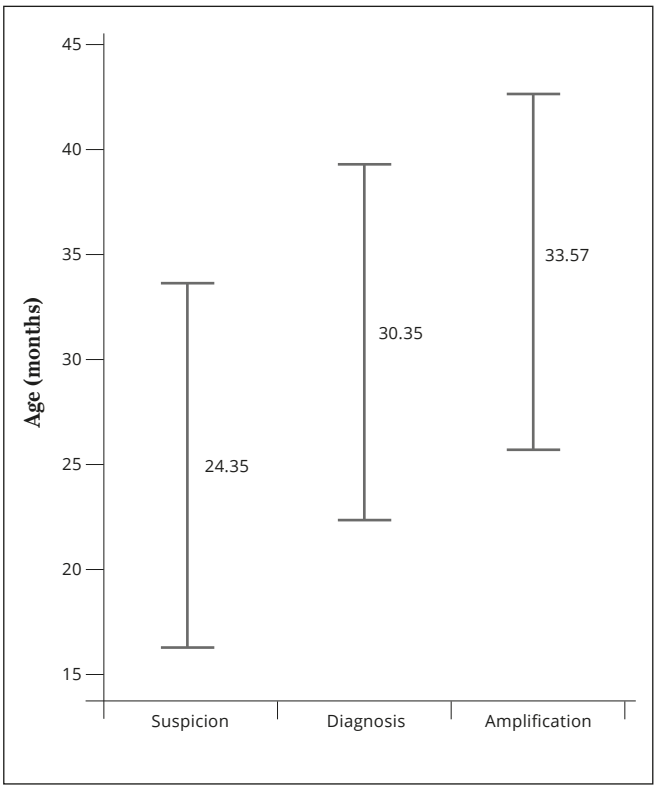

Figure 2. Mean ages of suspicion, diagnosis and amplification

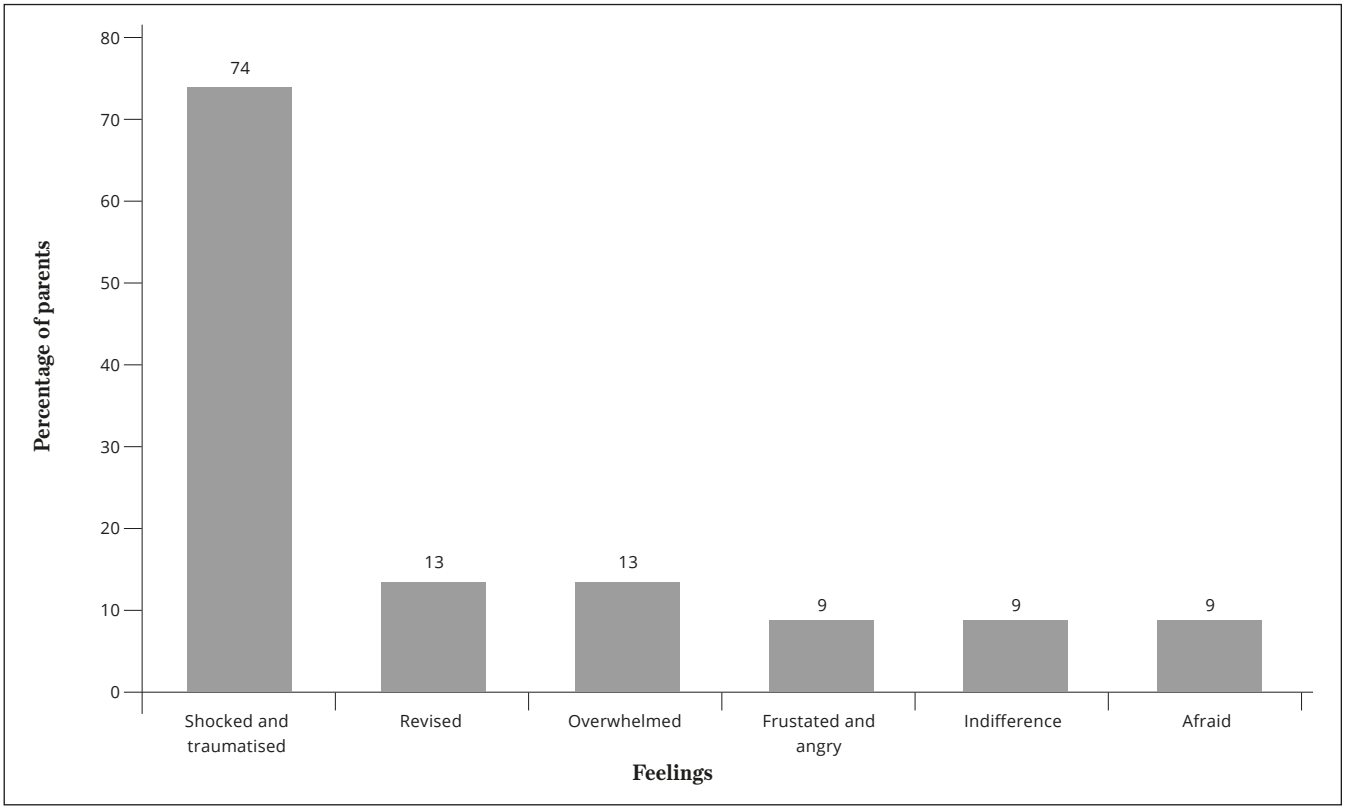

Figure 3. Feelings when the diagnosis was reported

good starting point, since there is a higher prevalence of hearing loss in such children (Hille et al., 2007). Patel and Feldman (2011) believe that the absence of a newborn hearing screening programme significantly delays identification of children with hearing impairment. In fact, the introduction of a newborn hearing screening programme in Slovakia resulted in a lower average age of diagnosis of children with a hearing loss (Jakubíková et al., 2009).

3.3 The impact of hearing loss on the parents' quality of life (QOL)

The feelings of the parents after receiving the diagnosis of a hearing loss are illustrated in Figure 3. The majority of parents in this study reported that the diagnosis of a hearing loss evoked negative emotions, with shock and trauma being the most commonly mentioned feelings. Congruently, Jackson et al. (2008) reveal that feelings reported by parents whose children were diagnosed with a hearing loss included shock, fear and uncertainty about the future, denial and indifference. When questioned about the support they received after diagnosis, parents of 13 subjects (57%) felt that they would have benefitted from more support, while parents of nine subjects (39%) believed that more support would not have been more beneficial for them. Parents of one subject (4%) were uncertain whether they would have benefitted from more support or not.

Thirteen mothers (57%) and 15 fathers (94%) from Sample A described their overall QOL as good or very good, while all mothers and fathers (100%) from Sample B described their QOL as good or very good. Moreover, 18 mothers (78%) and 13 fathers (81%) from Sample A were satisfied or very satisfied with their own health while seven mothers (88%) and all fathers (100%) from Sample B were satisfied or very satisfied with their own health.

A Kolmogorov-Smirnov test confirmed that the dependent variables, thus, the transformed QOL scores, had a normal distribution in all four QOL domains provided by mothers and fathers. The one-way Analysis of Variance (ANOVA) test was used to compare the mean transformed QOL scores provided by mothers and fathers for three independent groups, which included parents of children who use hearing aids[3], parents of children who use cochlear implants[4] and parents of children with normal hearing (Table 5). Figure 4 illustrates the mean QOL scores of mothers and fathers of the aforementioned groups. The discrepancy between the QOL of the three groups of parents was not statistically significant in any of the four domains. This may be attributed to the fact that, in the majority of the cases, more than one year had passed since the diagnosis and, thus, the parents may have habituated to the situation. As time goes by following a diagnosis of a hearing loss, parents acquire resources which enable them to adjust to the child's hearing loss (Burger et al., 2005). Moreover, the fact that all children received amplification devices may have affected the parents' QOL. In fact, Burger et al. (2005) argue that in many families, a return to normality may be noticed once amplification devices are fitted. Despite the fact that the difference between the three groups was not statistically significant, a discrepancy in the parents' satisfaction with the amplification devices used was observed. Whilst all parents of children who use cochlear implants were very satisfied with this device, half of the parents whose children used or were currently using digital behind the ear hearing aids reported that they were dissatisfied or very dissatisfied with this device. Parents of children who were currently using hearing aids rated their QOL slightly lower in all four domains when compared to parents of children who were using cochlear

3 This group included parents of children who use one or two hearing aids, depending on whether their loss was unilateral or bilateral.

4 This group included parents of children who use two cochlear implants and parents of children who use a cochlear implant and a hearing aid.

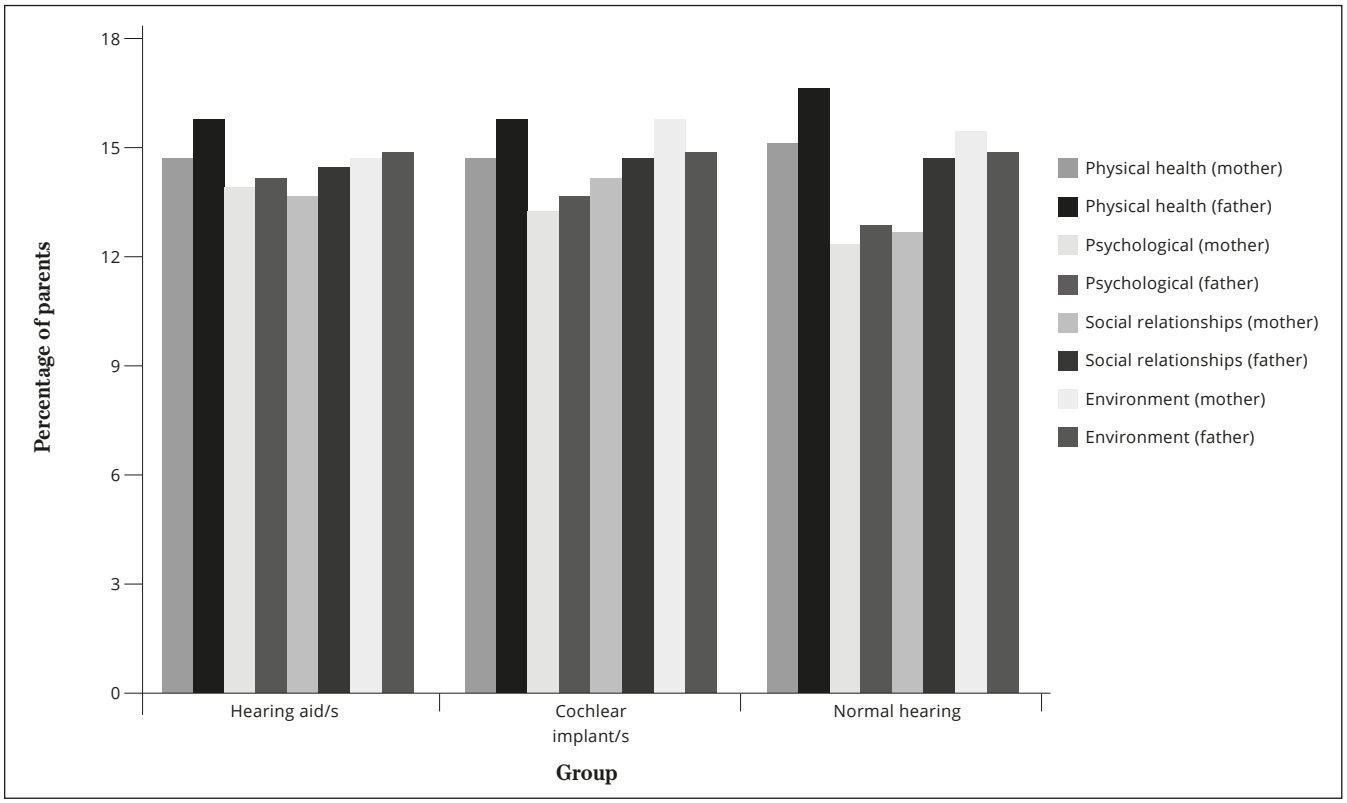

Figure 4. Analysis of quality of life

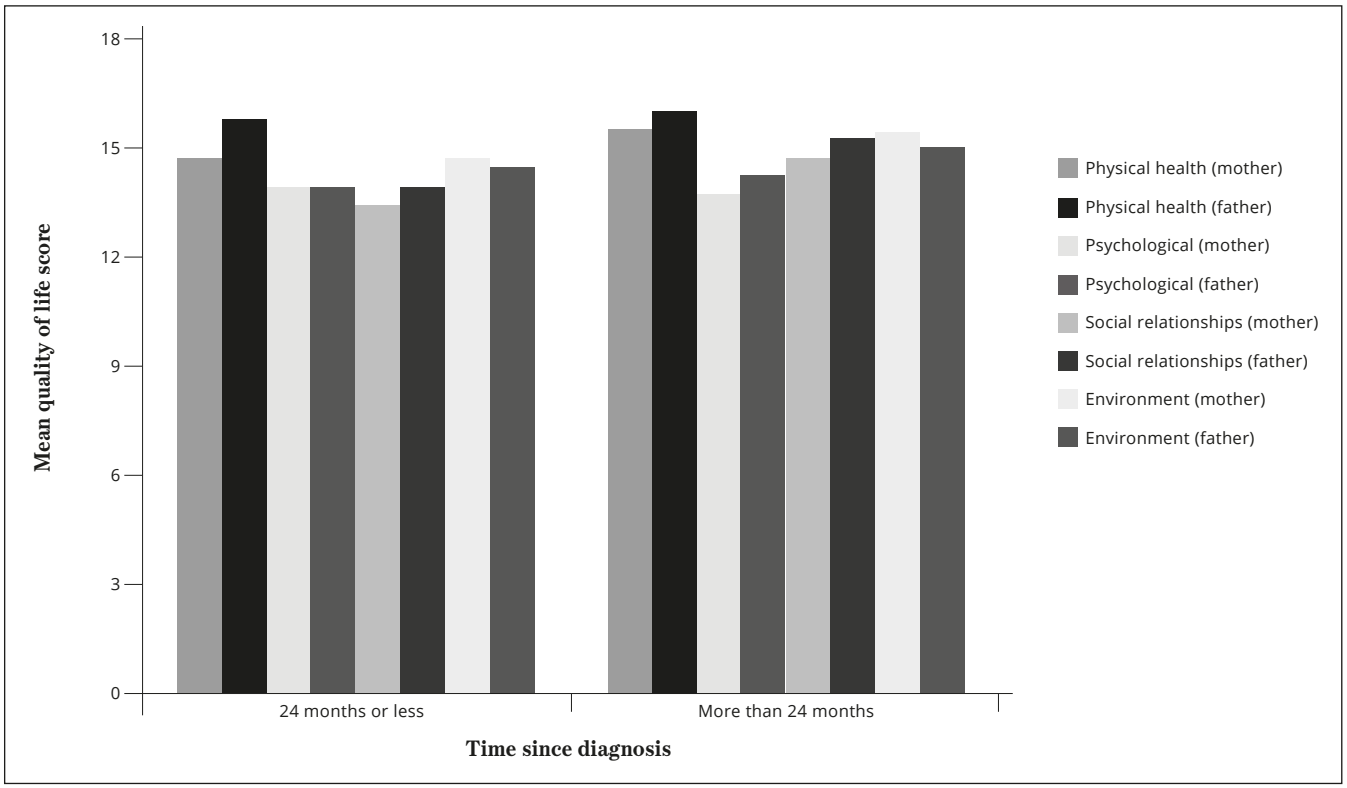

Figure 5. The effect of time after diagnosis on the quality of life

Table 5. One-way ANOVA analysis of parents' quality of life

Domain	Group	Mean	Std. Deviation	95% CI for Mean		*F*-statistic	*p*-value
				Lower Bound	Upper Bound		
Physical health (mother)	HAs	14.53	1.19	13.88	15.19	.923	.409
	CIs	14.75	1.39	13.59	15.91		
	NH	15.25	1.04	14.38	16.12		
Physical health (father)	HAs	15.55	1.93	14.92	16.17	2.101	.149
	CIs	15.60	1.14	14.18	17.02		
	NH	16.57	1.27	15.39	17.75		
Psychological health (mother)	HAs	13.87	1.13	13.24	14.49	.480	.623
	CIs	14.00	1.41	12.82	15.18		
	NH	14.38	1.06	13.49	15.26		
Psychological health (father)	HAs	14.27	1.19	13.47	15.07	.152	.860
	CIs	14.40	1.14	12.98	15.82		
	NH	14.57	1.98	13.67	15.47		
Social relationships (mother)	HAs	13.60	1.77	12.62	14.58	1.596	.221
	CIs	14.25	1.58	12.93	15.57		
	NH	15.00	2.07	13.27	16.73		
Social relationships (father)	HAs	14.45	1.64	13.36	15.55	.813	.458
	CIs	15.20	1.48	13.36	17.04		
	NH	15.29	1.25	14.13	16.45		
Environment (mother)	HAs	14.40	1.45	13.59	15.21	2.236	.126
	CIs	15.13	1.46	13.91	16.34		
	NH	15.63	1.06	14.74	16.51		
Environment (father)	HAs	14.73	1.27	13.87	15.58	.754	.483
	CIs	15.00	1.71	14.12	15.88		
	NH	15.43	1.27	14.25	16.61		

Note. CI = confidence interval; HAs = hearing aid/s; CIs = cochlear implant/s; NH = normal hearing

implants. Furthermore, parents of children who were using cochlear implants had marginally lower QOL scores when compared to parents of children without a hearing loss. This implies that in the present study, the disparity in the satisfaction rating of the amplification device used did not significantly affect the QOL of parents in any of the four assessed domains.

The one-way ANOVA test was also used to compare the mean transformed QOL scores provided by mothers and fathers for another two independent groups. Parents were divided according to the gap between the day their child was diagnosed with a hearing loss and the day the researcher carried out the interview, either less than or equal to 24 months or more than 24 months (Table 6). Figure 5 shows a clustered bar graph of the mean QOL scores of mothers and fathers of the above mentioned groups. QOL scores were marginally higher for mothers and fathers whose gap between the day of diagnosis and the interview date was more than 24 months, when compared to parents whose gap was 24 months or less. However, statistically significant differences have only been observed in the mothers' physical health (p = .029) and social relationships (p = .049) domains. In fact, Meadow-Orlans (1995) states that when compared to fathers, mothers of children with hearing impairment are more likely to experience stress. This could be because mothers may take more responsibility for the daily needs of their children (Jaffe & Cosper, 2015).

These results should be interpreted in the light of the small samples involved and, thus, assumptions may not be generalisable to the whole population. The limited number of participants possibly does not make the sample representative of the population of parents of children with a hearing loss as well as parents of children without a hearing loss. More studies with larger sample sizes, which employ a more in-depth analysis covering wider age ranges, are required. Since QOL is influenced by a considerable amount of variables, longitudinal studies may provide a better understanding of the process of adaptation and transitions of families of children with hearing impairment. Analysis of the impact of a hearing loss on other family members such as grandparents and siblings may also be carried out.

4 Conclusions and Recommendations

The results of this study support the claims in the literature that early identification and intervention is crucial for children with hearing impairment. The guidelines proposed by the Joint Committee on Infant Hearing (2007) for screening, identification and amplification of children with hearing impairment, may never be followed unless a newborn hearing screening programme is implemented. The fact that Malta is a small country with a manageable population is one of the advantages which may facilitate the implementation of a newborn hearing screening programme (Grech, 1994). More awareness campaigns on childhood hearing loss may also be provided to the general public. Such campaigns may help parents identify the signs of a hearing loss at an earlier stage, which could be fruitful for the identification of both congenital and acquired hearing losses.

Table 6. One-way ANOVA analysis of the effect of time after diagnosis on parents' QOL

Domain	Group	Mean	Std. Deviation	95% CI for Mean		*F*-statistic	*p*-value
				Lower Bound	Upper Bound		
Physical health (mother)	≤ 24 months	14.08	0.79	13.58	14.59	5.477	.029
	> 24 months	15.18	1.40	14.24	16.12		
Physical health (father)	≤ 24 months	15.29	0.76	14.59	15.98	1.028	.328
	> 24 months	15.78	1.09	14.94	16.62		
Psychological health (mother)	≤ 24 months	13.50	1.00	12.86	14.14	3.263	.085
	> 24 months	14.36	1.29	13.50	15.23		
Psychological health (father)	≤ 24 months	13.86	1.22	12.73	14.98	2.143	.165
	> 24 months	14.67	1.00	13.90	15.44		
Social relationships (mother)	≤ 24 months	13.17	1.53	12.20	14.14	4.373	.049
	> 24 months	14.55	1.64	13.45	15.64		
Social relationships (father)	≤ 24 months	13.86	1.46	12.50	15.21	4.163	.061
	> 24 months	15.33	1.41	14.25	16.42		
Environment (mother)	≤ 24 months	14.25	1.55	13.27	15.23	1.975	.175
	> 24 months	15.09	1.30	14.22	15.96		
Environment (father)	≤ 24 months	14.29	1.38	13.01	15.56	3.227	.094
	> 24 months	15.22	0.67	14.71	15.73		

Note. CI = confidence interval; domains with a p-value < .05 are in boldface.

The importance of support for parents and caregivers of children with hearing impairment cannot be overrated. More intensive support may be indicated for parents (especially the mothers) whose children have been diagnosed with a hearing loss. Counselling enables caregivers to make informed decisions about their child's future. Supporting the family of a child with hearing impairment will likely result in family growth, which can in turn be beneficial for the child (DeConde Johnson, 1997).

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7 Conflicts of interest

The authors report no conflicts of interest.

References

Bruer, J. T. (2008) Critical periods in second language learning: distinguishing phenomena from explanation. In M. Moody & E. Silliman (Eds) *Brain, Behavior and Learning in Language and Reading Disorders* (pp. 72-98). New York: The Guilford Press.

British Society of Audiology (2011) *Recommended Procedure: Pure-Tone Air-Conduction and Bone-Conduction Threshold Audiometry With and Without Masking*. [Online] Available from:http://www.thebsa.org.uk/docs/docsfromold/BSA_RP_PTA_FINAL_24Sept11_MinorAmend06Feb12.pdf. [Accessed 9th September 2015].

Burger, T., Spagn, C., Richter, B., Eissele, S., Löhle, E. & Bengel, J. (2005) Parental distress: the initial phase of hearing aid and cochlear implant fitting. *American Annals of the Deaf,* 150(1), pp. 5-10.

Busacco, D. (2010) *Audiologic Interpretation Across the Lifespan*. Boston: Pearson Education.

Canale, A., Favero, E., Lacilla, M., Recchia, A., Schindler, A., Roggero, N. & Albera, R. (2006) Age at diagnosis of deaf babies: a retrospective analysis highlighting the advantage of newborn hearing screening. *International Journal of Pediatric Otorhinolaryngology,* 70(7), pp. 1283-1289.

Childsupport (2007) *Milestones*. [Online] Available from: https://www.childsupport.in/html/ home_milestone.html. [Accessed 8th July 2015].

Creswell, J. W. (2014) *Research Design: Qualitative, quantitative, and mixed methods approaches (4th ed.)* London: SAGE Publications.

Czaja, R. & Blair, J. (2005) *Designing Surveys: A guide to decisions and procedures (2nd ed.)*. California: Pine Forge Press.

DeConde Johnson, C. (1997) Understanding and advising parents and families. *Hearing Review,* 4(10), pp. 18–20.

Diefendorf, A. O. (2009) Assessment of hearing loss in children. In J. Katz, L. Medwetsky, I. Burkard & L. Hood (Eds.) *Handbook of Clinical Audiology* (pp. 545-563). Philadelphia: Lippincott Williams & Wilkins.

Dosman, C. F., Andrews, D. & Goulden, K. J. (2012) Evidence-based milestone ages as a framework for developmental surveillance. *Paediatrics & Child Health*, 17(10), pp. 561-568.

Elwick, H., Joseph, S., Becker, S. & Becker, F. (2010) *Adult Carer Quality of Life Questionnaire*. Nottingham: The Princess Royal Trust for Carers.

European Foundation for the Improvement of Living and Working Conditions (2009) *Second European Quality of Life Survey*. Luxembourg: Office for Official Publication of the European Communities.

Fitzpatrick, E., Angus, D., Durieux-Smith, A., Graham, I. D. & Coyle, D. (2008) Parents' needs following identification of childhood hearing loss. *American Journal of Audiology,* 17(1), pp. 38-49.

Gallaudet Research Institute (2011) *Regional and National Summary Report of Data from the 2009-10 Annual Survey of Deaf and Hard of Hearing Children and Youth*. Washington, DC: GRI, Gallaudet University.

Garstecki, D. & Erler, S. (2009) Management of adults with hearing loss. In J. Katz, L. Medwetsky, I. Burkard & L. Hood (Eds.) *Handbook of Clinical Audiology* (pp. 955-970). Philadelphia: Lippincott Williams & Wilkins.

Gilbey, P. (2010) Qualitative analysis of parents' experience with receiving the news of the detection of their child's hearing loss. *International Journal of Pediatric Otorhinolaryngology,* 74(3), pp. 265-270.

Grech, H. (1994) Hearing disability in children: the outcome in Malta. *Journal of the British Association of Teachers of the Deaf,* 18(1), pp. 30-33.

Grech, H. (1999) Facilitating communication development in hearing impaired children: the situation in Malta and Gozo. *Proceedings of the XXVIth World Congress of the International Association of Logopedics and Phoniatrics.* Amsterdam, The Netherlands.

Harrison, M. & Roush, J. (1996) Age of suspicion, identification, and intervention for infants and young children with hearing loss: a national study. *Ear and Hearing,* 17(1), pp. 55–62.

Hille, E. T. M., van Straaten, H. L. M. & Verkerk, P. H. (2007) Prevalence and independent risk factors for hearing loss in NICU infants. *Acta Paediatrica,* 96(8), pp. 1155-1158.

Humphries, T., Kushalnagar, P., Mathur, G., Jo Napoli, D., Padden, C., Rathmann, C. & Smith, S. R. (2012) Language acquisition for deaf children: reducing the harms of zero tolerance to the use of alternative approaches. *Harm Reduction Journal*, 9(1), pp. 16-24.

Jackson, C. W. & Turnbull, A. (2004) Impact of deafness on family life: a review of the literature. *Topics in Early Childhood Special Education,* 24(1), pp. 15-29.

Jackson, C. W., Traub, R. J. & Turnbull, A. P. (2008) Parents' experiences with childhood deafness: implications for family-centered services. *Communication Disorders Quarterly,* 29(2), pp. 82-98.

Jackson, C. W., Wegner, J. R. & Turnbull, A. P. (2010) Family quality of life following early identification of deafness. *Language, Speech, and Hearing Services in Schools,* 41(2), pp. 194-205.

Jafari, Z., Malayeri, S. & Ashayeri, H. (2007) The ages of suspicion, diagnosis, amplification, and intervention in deaf children. *International Journal of Pediatric Otorhinolaryngology,* 71(1), pp. 35-40.

Jaffe, L. & Cosper, S. (2015) Working with Families. In J. Case-Smith & J. C. O'Brien (Eds.) *Occupational Therapy for Children and Adolescents*. Missouri: Elsevier Mosby.

Jakubíková, J., Kabátová, Z., Pavlovčinová, G. & Profant, M. (2009) Newborn hearing screening and strategy for early detection of hearing loss in infants. *International Journal of Pediatric Otorhinolaryngology* 73(4), pp. 607-612.

Joint Committee on Infant Hearing (2007) Year 2007 position statement: principles and guidelines for early hearing detection and intervention programs. *Pediatrics,* 120(4), pp. 898-921.

Kushalnagar, P., Mathur, G., Moreland, C. J., Napoli, D. J., Osterling, W., Padden, C. & Rathmann, C. (2010) Infants and children with hearing loss need early language access. *The Journal of Clinical Ethics*, 21(2), pp. 143–154.

Lederberg, A. R. & Golbach, T. (2002) Parenting stress and social support in hearing mothers of deaf and hearing children: a longitudinal study. *Journal of Deaf Studies and Deaf Education,* 7(4), pp. 330-345.

Meadow-Orlans, K. P. (1995) Sources of stress for mothers and fathers of deaf and hard of hearing infants. *American Annals of the Deaf,* 140(4), pp. 352–357.

Meinzen-Derr, J., Lim, L. H. Y., Choo, D. I., Buyniski, S. & Wiley, S. (2008) Pediatric hearing impairment caregiver experience: impact of duration of hearing loss on parental stress. *International Journal of Pediatric Otorhinolaryngology,* 72(11), pp. 1693-1703.

Mitchell, R. E. & Karchmer, M. A. (2004) Chasing the mythical ten percent: parental hearing status of deaf and hard of hearing students in the United States. *Sign Language Studies,* 4(2), pp. 138–163.

Moores, D. F., Jatho, J. & Dunn, C. (2001) Families with deaf members: American annals of the deaf, 1996 to 2000. *American Annals of the Deaf,* 146(3), pp. 245-250.

Morton, D. D. (2000) Beyond parent education: the impact of extended family dynamics in deaf education. *American Annals of the Deaf,* 145(4), pp. 359-365.

National Statistics Office (2014) *Census of Population and Housing 2011: Volume 1 Population*. Valletta: National Statistics Office, Malta.

Olusanya, B. O., Ruben, R. J. & Parving, A. (2006) Reducing the burden of communication disorders in the developing world: an opportunity for the millennium development project. *Journal of the American Medical Association,* 296(4), pp. 441-444.

Ozcebe, E., Sevinc, S. & Belgin, E. (2005) The ages of suspicion, identification, amplification and intervention in children with hearing loss. *International Journal of Pediatric Otorhinolaryngology,* 69(8), pp. 1081-1087.

Patel, H. & Feldman, M. (2011) Universal newborn hearing screening. *Paediatrics and Child Health,* 16(5), pp. 301-305.

Robson, C. (2011) *Real World Research: A resource for users of social research methods in applied settings (3rd ed.)* West Sussex: John Wiley & Sons.

Sharma, A., Dorman, M. F. & Spahr, A. J. (2002) A sensitive period for the development of the central auditory system in children with cochlear implants: implications for age of implantation. *Ear and Hearing,* 23(6), pp. 532–539.

Sininger, Y. S., Grimes, A. & Christensen, E. (2010) Auditory development in early amplified children: factors influencing auditory-based communication outcomes in children with hearing loss. *Ear and Hearing,* 31(2), pp. 166-185.

Skevington, S. M., Lotfy, M. & O'Connell, K. A. (2004) The World Health Organization's WHOQOL-BREF quality of life assessment: psychometric properties and results of the international field trial. A Report from the WHOQOL Group. *Quality of Life Research,* 13(2), pp. 299-310.

Spiteri, L., Borg, G., Callus, A. M., Cauchi, J. & Sciberras, M. (2004) *Inclusive and Special Education: Review report*. Floriana: Ministry of Education, Youth and Employment, Malta.

Stevens, G., Flaxman, S., Brunskill, E., Mascarenhas, M., Mathers, C. D. & Finucane, M. (2013) Global and regional hearing impairment prevalence: an analysis of 42 studies in 29 countries. *The European Journal of Public Health,* 23(1), pp. 146-152.

Weisel, A., Most, T. & Michael, R. (2007) Mothers' stress and expectations as a function of time since child's cochlear implantation. *Journal of Deaf Studies and Deaf Education,* 12(1), pp. 55-64.

World Health Organisation (1996) *WHOQOL-BREF: Introduction, administration, scoring and generic version of the assessment.* Geneva: World Health Organisation.

World Health Organisation (1998) *WHOQOL User Manual.* Geneva: World Health Organisation.

World Health Organisation (2013) *Deafness and Hearing Loss.* [Online] Available from http://www.who.int. [Accessed 8th July 2015].

World Health Organisation & The World Bank (2011) *World Report on Disability.* Geneva: World Health Organisation.

Young, A. & Tattersall, H. (2007) Universal newborn hearing screening and early identification of deafness: parents' responses to knowing early and their expectations of child communication development. *Journal of Deaf Studies and Deaf Education,* 12(2), pp. 209-220.