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Identification of Participation-Related Activities to Be Used As Part of the Development of a Self-Efficacy Questionnaire for Adolescents with Hearing Loss

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A thesis submitted in partial fulfillment of the requirements for the Master of Science degree in Health and Rehabilitation Sciences

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by

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Abstract

Investigating self-efficacy beliefs among adolescents with hearing loss is imperative as these perceptions affect a broad range of age-related functioning. Validated self-efficacy questionnaires for use with persons with hearing loss are currently limited to four adult measures. Development of an adolescent-relevant questionnaire aims to quantify self-efficacy for participation in daily activities and to individualize treatment interventions for adolescents with hearing loss.

Developing the self-efficacy questionnaire was based on a literature review to develop a list of activities performed by typically developing adolescents. The questionnaire was piloted on a sample of youth with hearing loss.

The Adolescent Self-Efficacy Questionnaire for Hearing Loss (ASEQ-HL) is a 37-item questionnaire based on the inventory of youth-related activities. The activities were linked to the International Classification of Functioning, Disability and Health - Children and Youth (ICF-CY) framework. The questionnaire was structured according to self-efficacy questionnaire development guidelines proposed by Bandura (2006b).

Keywords

Self-Efficacy, Hearing Loss, Adolescents, Bandura, Questionnaire, Adolescent-Related Activities, International Classification of Functioning, Disability and Health, ICF-CY

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List of Abbreviations

ASEQ-HL	Adolescent Self-Efficacy Questionnaire for Hearing Loss
BMSLSS	Brief Multidimensional Student Life Satisfaction Scale
CAPE	Children's Assessment of Participation and Enjoyment
CHILD	Children's Home Inventory for Listening Difficulties
CI	Confidence Interval
COSI-C	Client Oriented Scale of Improvement for Children
dB	Decibel
FM	Frequency Modulated
GAS	Goal Attainment Scaling
HEAR-QL	Hearing Environments And Reflection on Quality of Life
Hz	Hertz
ICC	Intra-Class Coefficient
ICF	International Classification of Functioning Disability and Health
ICF-CY	International Classification of Functioning Disability and Health, Children and Youth Version
LSEQ	Listening Self-Efficacy Questionnaire
MARS-HA	Measure of Audiological Rehabilitation Self-efficacy for Hearing Aid Questionnaire
MEQAS	Measure of Environmental Qualities of Activity Settings

NA	Not Applicable
NAL	National Acoustics Laboratory
PAC	Preferences for Activities of Children
PedsQL	Pediatric Quality of Life Questionnaire
PEM-CY	Participation and Environment Measures for Children and Youth
PSE	Perceived Self-Efficacy
QOL	Quality of Life
r	Pearson's Correlation Coefficient
r^2	Coefficient of Determination
SD	Standard Deviation
SE	Self-efficacy
SEAS	Self-reported Experiences of Activity Settings
SEM	Standard Error of Measurement
SESM-Q	Self-Efficacy for Situational Communication Management Questionnaire
SETM-Q	Self-Efficacy for Tinnitus Management Questionnaire
TV	Television
WHO	World Health Organization

Chapter 1

1 INTRODUCTION

1.1 Thesis Purpose: Development of an Adolescent Self-Efficacy Questionnaire

There exists a gap in the current literature involving self-efficacy questionnaires that queries the certainty with which adolescents living with hearing loss manage communication in important everyday environments and activities. This measure is valuable to audiological patient-centred care and has the potential to identify strengths and barriers that limit activities and restrict participation. It could facilitate shared goal setting and decision making between adolescents, caregivers and audiologists.

1.2 Self-Efficacy

According to Bandura (1997), self-efficacy (SE) is the subjective judgment of one's capabilities to organize and execute courses of actions to attain designated goals. Said another way, it is the belief in one's own capabilities to successfully accomplish something. Self-efficacy judgments are: (1) task and situation specific, for example, an adolescent who has hearing loss may have a strong feeling of self-efficacy when managing communication in a one-to-one conversation, and less self-efficacious in a large social setting; (2) a belief of what someone can do rather than personal judgments of one's physical or personality attributes, which are more consistent with concepts of self-worth; (3) dependent on a mastery criterion of performance rather than on normative or other criteria; and (4) assessed prior to engaging in a particular task or activity. These four features of self-efficacy differentiate it from self-concept, self-esteem, outcome expectations, perceived control and self-confidence (Zimmerman & Cleary, 2006).

Understanding the sources of influence on self-efficacy will help to promote an individual's sense of SE and appreciate the situational events potentially affecting one's SE. The first and strongest source of SE perception is enactive mastery experiences, or prior accomplishments (Bandura, 1997). This is the notion that individuals will experience a sense of mastery for a particular behaviour and infer judgements about their

capabilities to accomplish such an activity by having performed that task successfully (Bandura, 1997). If public speaking is a desired behaviour, for example, then doing so without incident will yield a sense of mastery in that individual, thus likely enhancing that individual's SE (Smith & West, 2006). On the other hand, failure to successfully accomplish a particular behaviour will have adverse effects on an individual's SE, likely reducing it.

SE is also based on an individual's observations of other people's experiences, a concept referred to as vicarious experiences (Bandura, 1997). This modelling of behaviour allows individuals to perceive their own capabilities in reference to the success and failure of others carrying out the same task. The influence of a vicarious model, often a peer, is strongest when there are similarities in age, ability and gender (Schunk & Meece, 2006). For example, observing others successfully deliver a public presentation will likely instil in the observer a stronger sense of capability in also accomplishing that task (Smith & West, 2006).

Verbal persuasion, the most commonly used influential source of SE, is the expression of others' beliefs in an individual's capabilities (Bandura, 1997). Individuals may receive verbal encouragements from others, which will increase their SE beliefs for that particular activity. This is most effective if the individual actually possesses the skills to achieve that task. Verbal persuasion feedback that is meant to encourage success should focus on the specific capability of an individual and be realistic (Bandura, 1997). The public speaker that hears encouraging phrases such as "you can do it!", for instance, will likely feel a greater sense of SE.

Finally, individuals may judge their capabilities by observing their own physiological or affective states while accomplishing a particular activity (Bandura, 1997). As such, individuals associate positive emotions while performing a desired behaviour with greater skill and ability, thus potentially raising their SE for that task. Conversely, negative emotions such as anxiety, nervousness and bad mood during the activity are likely interpreted as a result of inadequacy and lead to reduced SE perceptions (Smith & West, 2006). If in preparation for the public presentation, for example, the speaker becomes

extremely stressed, he / she may interpret unusually rapid heart rate and anxiety as indicators of personal ineffectiveness.

1.3 Self-Efficacy Perceptions in Adolescents

Self-efficacy perceptions do not seem to develop according to a specific and structured timeframe among children and adolescents (Schunk & Meece, 2006). Self-efficacy, however, is affected by various factors, including ones that are associated with the development of youth. During adolescence, the time extending from puberty to early twenties, youth experience significant changes in family relations, school environments, and peer groups, as well as overall physical, cognitive, social and emotional changes (Schunk & Meece, 2006). This period of growth is challenging because it also involves changes in priorities and dependency levels associated with transitioning from childhood to adulthood.

Families, for example, are a major factor in the development of SE beliefs in adolescents. Challenging and encouraging home environments with high and realistic aspirations and positive role models support mastery of experience and coping skills (Schunk & Miller, 2002). Differences in socioeconomic status and parental SE perceptions, however, have been found to account for some differences in the influence of families on SE development. The school environment also contains many potential influences on adolescents' SE, which also affects students' academic motivation and achievement. School environments that are centralized to the learner, adapt to individualized needs, value student opinions and create supportive relations, help enhance SE perceptions in youth (Meece, Herman, & McCombs, 2003). Furthermore, peers contribute significantly to the personal development and social relationships of adolescents. They also influence each other's views of self-worth, which were formerly influenced by parents and caregivers during childhood (Schunk, 1987). These three contextual factors are among the key areas of research regarding adolescents' self-efficacy beliefs (Schunk & Meece, 2006).

The importance of being self-efficacious in adolescence is exemplified by its involvement in young individuals' school-related functioning. In the area of academic

motivation, for example, self-efficacious students display higher levels of engagement, dedication and effort even when obstacles are encountered relative to their peers with lower SE (Pajares, 1996). Likewise, with respect to academic achievement, students with high SE use more effective problem-solving strategies, persevere through difficulties and generally achieve higher performance than students with lower SE (Pajares, 1996). Finally, in terms of academic and personal development, students with higher SE beliefs have more academic ambitions, experience less depression, and develop prosocial behaviour compared to their less self-efficacious peers (Pajares, 1996).

The role of SE in adolescence expands into other areas of age-related activities including: family function, educational development, career aspirations and trajectories, health promotion, affect regulation, management of high-risk activities, political participation and social commitment (Bandura, 2006a). Generally, highly self-efficacious youth participate more effectively in the aforementioned age-related matters, relative to their peers with lower SE.

1.4 Self-Efficacy Perceptions in Youth with Disabilities

Self-efficacy perceptions are also influenced by disabilities and chronic conditions. Children with disabilities have reported lower self-efficacy than their typically developing peers. For example, in a study involving elementary school students, Tabassam and Grainger (2002) found that students with learning disabilities and attention-deficit hyperactivity disorder reported significantly lower scores on academic self-efficacy beliefs than typically developing peers. Similarly, children with multiple sclerosis report lower physical activity self-efficacy than their peers (Sawicki et al., 2015).

Furthermore, Cramm, Strating, Roebroeck, and Nieboer (2013) investigated the perceived self-efficacy of adolescents with a variety of chronic conditions, including diabetes, rheumatoid arthritis, cystic fibrosis, kidney conditions, urological conditions, and neuromuscular disorders. They identify that self-efficacy is an important factor in coping with the challenges and demands presented by such chronic conditions. Using the Generalized Self-Efficacy scale by Schwarzer and Jerusalem (1995), they measured the

self-efficacy of these adolescents as perceived by the adolescents and their parents. Their findings revealed that adolescents' perceived self-efficacy varied among the various chronic conditions, with adolescents with cystic fibrosis having the highest general self-efficacy score. Adolescents with urological conditions had the lowest scores of general self-efficacy, likely due to the social unacceptance of many of their associated problems (Cramm et al., 2013). They also found that the self-efficacy perceptions as reported by the adolescents were lower than parents' perceptions of their children's general self-efficacy; this is possibly due to the parents' positive perceptions of their children's self-efficacy in light of their age and chronic condition (Cramm et al., 2013). Finally, the authors examined the influence of these adolescents' general self-efficacy perceptions on their quality of life. They found that adolescents' perceived general self-efficacy, as perceived by the adolescents and their parents were related to and may affect the physical, emotional and social domains of quality of life. Therefore, the authors highlighted the importance of interventions that aim to improve general self-efficacy among adolescents with chronic conditions (Cramm et al., 2013).

1.5 Participation, Environment and Function in the ICF-CY

The World Health Organization (WHO)'s International Classification of Functioning, Disability and Health (ICF) proposes a bio-psycho-social model of health, determined by dimensions of functioning and disability across contextual factors (World Health Organization [WHO], 2001). It provides a common and universal language for clinicians, healthcare providers and researchers to document and measure health and disability (WHO, 2001). As displayed in Figure 1-1, the ICF framework consists of various characteristic components: (1) body functions and structures, which refer to the human body's anatomy, and physiological and psychological functions; (2) activity and participation, which describe the execution of a task or action by an individual, and involvement in a life situation, respectively; contextual factors including (3) personal factors, consisting of unique characteristics of an individual's life and living, and (4) environmental factors, which consist of the physical, social, and attitudinal environments in which people live and conduct their lives (WHO, 2001). When individuals experience difficulties in carrying out an activity, it is referred to as an activity limitation; when

individuals experience difficulty being involved in a life event, it is referred to as a participation restriction (WHO, 2001).

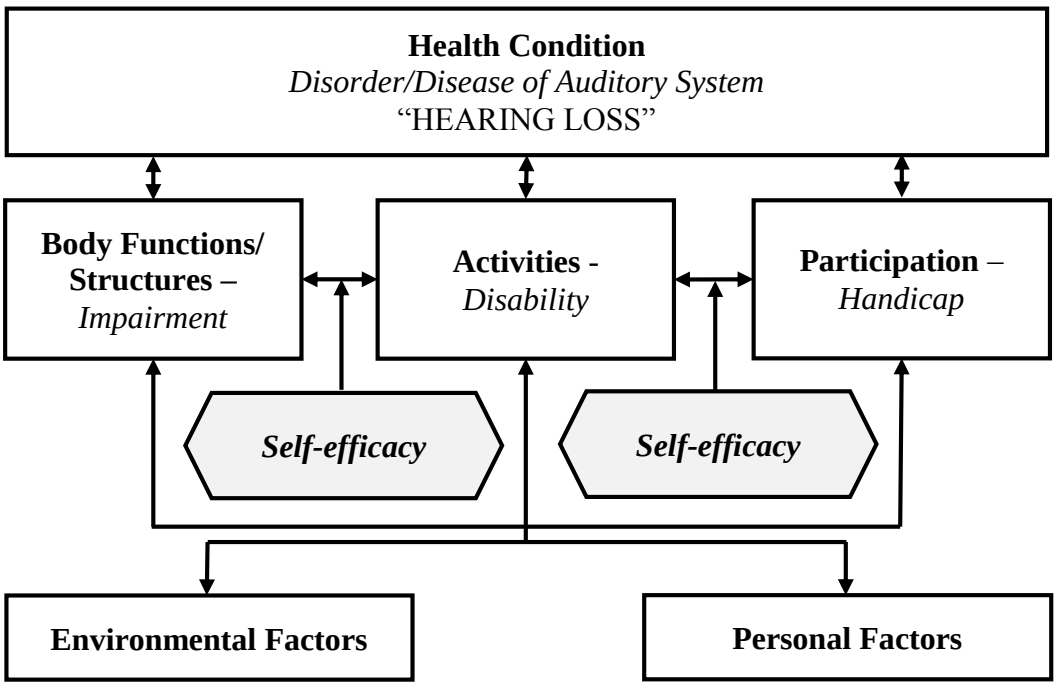

Figure 1-1. The Components of the ICF framework, the Effects of Hearing Loss on the Framework and the Potential for SE to Positively Impact the Process (Smith and West, 2006).

The children and youth version of the original ICF framework, referred to as the ICF-CY, was subsequently published to classify the functional characteristics of a maturing child (WHO, 2007). It expands the coverage of the main framework by providing specific content and additional detail related to infants, toddlers, children, and adolescents (WHO, 2007). Since publication of the ICF and ICF-CY, comprehensive and brief core sets for disabilities including hearing loss have been developed to contain select categories to be used as a framework and practical tool to assess patient functioning (ICF Research Branch, 2009). These core sets are represented with an alpha-numerical label. For example, with respect to hearing loss, 'listening (d115)' is considered an activity; 'conversing with many people (d3504)' may be deemed a participation event; and 'social norms, practices and ideologies (e465)' are regarded as environmental factors (ICF Research Branch, 2009). An impairment in the ear (i.e., body function and / or structure) resulting in a hearing loss may limit an individual's listening ability (i.e., activity limitation), which may lead to misunderstandings of what is being said and the need for repetition and clarification. This individual may also be restricted in discussing with peers, and experience social difficulties (i.e., participation restrictions).

The ICF-CY and associated core sets are being increasingly used to guide pediatric rehabilitation. The domain of body functions and structure facilitates knowledge and understanding of the disability. The activity domain assists with defining and understanding important tasks and / or activities of daily living, and how contextual factors, such as environmental and personal factors, impact activity involvement. Participation provides information relative to the extent to which persons are actively engaged and / or restricted in these activities. Vargus-Adams and Majnemer (2014) provide examples for the use of the ICF-CY with two children. The first child has cerebral palsy and mild attention-deficit hyperactivity disorder and the second child has complex medical issues. Their paper provides an example of the use of the framework to broaden the focus from impairment and limitations of children based on their disability to better reflect life experiences considering personal strengths and environmental factors that positively or negatively influence health and functioning. The result in each case was a more individualized and holistic view of the child's current performance, potential intervention programs, and outcome measurement possibilities. McDougall and Wright

(2009) advocate combining the ICF-CY with Goal Attainment Scaling (GAS) to assist with translating broad areas defined for intervention based on the ICF-CY to distinct, measurable treatment goals using GAS. Whether the ICF-CY framework is used alone or in combination with other strategies such as GAS and / or standardized measures, one of its strengths lies in the provision of an overall common language that can be used to facilitate interdisciplinary collaboration which, in turn, can positively affect optimal child development and quality of life.

1.6 Prevalence and Self-Esteem of Adolescents with Hearing Loss

Recent Canadian and American statistics indicate the incidence of hearing loss in the adolescent population is approximately 20% (Marcoux et al., 2012; Shargorodsky, Curhan, Curhan, & Eavey, 2010). The equivalent prevalence of hearing loss in Canadian adolescents is approximately 800,000 individuals (Marcoux et al., 2012; Statistics Canada, 2014); and in American adolescents is approximately 6.5 million individuals (Shargorodsky et al., 2010). Therefore, the prevalence of hearing loss among Canadian and American adolescents is approximately 7.3 million.

A recent study by Warner-Czyz, Loy, Evans, Wetsel, and Tobey (2015) investigated the self-esteem in children and adolescents with hearing loss, because of challenges related to communication skills, physical appearance, and social maturity compared to normal hearing peers. They found that children with hearing loss, who wore cochlear implants or hearing aids, rated global self-esteem significantly more positively than peers with typical hearing abilities (Warner-Czyz et al., 2015). These children and adolescents with high self-esteem reported more social activities, slightly more friends, higher affiliation and attention scores, and lower depressive mood and shyness scores (Warner-Czyz et al., 2015). The authors also associated these favourably high self-esteem ratings to the fact that most of these children benefited from early intervention and indicated that they performed well with their hearing devices. Additionally, more than half of the participants attended cochlear implant summer camp, which the authors presume indicates that these individuals likely have involved parents and are not experiencing the typical demands of academic and extracurricular activities among their hearing peers.

In general, children with disabilities often face more activity limitations and participation restrictions relative to their typically developing peers, in part due to barriers within their environment (Anaby et al., 2013). Figure 1-1 illustrates the role of self-efficacy beliefs on the components of the ICF associated with a disorder of the auditory system (Smith & West, 2006). It is proposed that SE may be considered as a mediator of the rehabilitative process through its effects on an individual's impairment, activities, and participation. Therefore, it is not only advantageous to refer to the items listed in the ICF-CY and the core sets for hearing loss, but to explore and understand how SE interventions may be used to positively affect the functioning of youth in adolescent-specific participatory environments.

Chapter 2

2 REVIEW OF QUESTIONNAIRES

2.1 Self-Efficacy as a Potential Intervention and Treatment Paradigm

A review of the literature related to SE questionnaires specifically associated with hearing loss is limited to four inventories targeting an adult population: (1) the Self-Efficacy for Situational Communication Management Questionnaire (SESM-Q; Jennings, Cheesman, & Laplante-Lévesque, 2014); (2) the Measure of Audiological Rehabilitation Self-efficacy for Hearing Aid Questionnaire (MARS-HA; West & Smith, 2007); (3) the Listening Self-Efficacy Questionnaire (LSEQ; Smith, Pichora-Fuller, Watts, & La More, 2011); and (4) the Self-Efficacy for Tinnitus Management Questionnaire (SETMQ; Smith & Fagelson, 2011). These questionnaires have been successfully developed and validated to probe the self-efficacy beliefs of adults and are widely used in clinical settings and aural rehabilitation. They are typically not used with children, and likely do not reflect the needs of adolescents and children. Table 2-1 provides a summary of these adult audiology-related self-efficacy questionnaires.

Table 2-1. Summary of Self-Efficacy Measures for Individuals with Hearing Loss.

Questionnaire Name and Abbreviation	Description					Reference
	Number of items	Response format	Scoring format	Age range	Factors assessed	
Adult Audiology Self-efficacy Measures						
Listening Self-Efficacy Questionnaire (LSEQ)	18	- Self-report - 10-unit interval scale: 0 – 100%	- Subscales and total averages	- Adults, 18+	Listening self-efficacy - Dialogue in quiet - Focusing attention on single source - Complex auditory scenes	(Smith, Pichora-Fuller, Watts, & La More, 2011)*
Measure of Audiological Rehabilitation Self-efficacy for Hearing Aid Questionnaire (MARS-HA)	24	- Self-report - 10-unit interval scale: 0 – 100%	- Subscales and total averages	- Adults, 18+	Hearing aid self-efficacy: - Basic handling of hearing aids - Advanced handling and knowledge of hearing aids - Adjustment to hearing aids - Aided listening skills	(West & Smith, 2007)*
Self-Efficacy for Situational Communication Management	20	- Self-report - 10-unit interval scale: 0 – 100%	- Subscales and total scores	- Adults, 18+	Communication self-efficacy - Hearing ability - Confidence in handling the situation	(Jennings et al., 2014)*

Questionnaire (SESM-Q)						
Self-Efficacy for Tinnitus Management Questionnaire (SETMQ)	40	- Self-report - 10-unit interval scale: 0 – 100%	- Subscales and total scores	- Adults, 18+	Tinnitus self-efficacy - Routine tinnitus management - Emotional response - Internal thoughts and interactions with others - Tinnitus concepts - Devices	(Smith & Fagelson, 2011)*

*Signifies questionnaires are reliable and valid.

2.1.1 Listening Self-Efficacy Questionnaire

The Listening Self-Efficacy Questionnaire (LSEQ), assesses individuals' confidence and belief in their capabilities to successfully listen in specific situations (Smith et al., 2011). It has been employed in various clinical settings and may be used to measure aural rehabilitation outcomes. This questionnaire features 18 items and three subscales targeting dialogue in quiet; focusing attention on single sources; and complex auditory scenes. The psychometric properties of the LSEQ were obtained in a study of 169 adult patients with hearing loss. It was found to have excellent internal consistency, reliability and validity (Smith et al., 2011).

2.1.2 Measure of Audiological Rehabilitation Self-efficacy for Hearing Aid Questionnaire

The Measure of Audiological Rehabilitation Self-efficacy for Hearing Aid Questionnaire (MARS-HA) measures SE related to hearing aid orientation (West & Smith, 2007). It consists of 24 items and four subscales that cover clients' behaviour in the areas of basic handling of hearing aids; advanced handling and knowledge of hearing aids; adjustment to hearing aids; and aided listening skills. The psychometric properties of the MARS-HA were obtained in a study of 173 adult patients with hearing loss. It was found to have strong internal consistency, reliability, and validity (West & Smith, 2007).

2.1.3 Self-Efficacy for Situational Communication Management Questionnaire

The Self-Efficacy for Situational Communication Management Questionnaire (SESM-Q) aims to assess communication self-efficacy (Jennings et al., 2014). It measures capabilities of motivation, cognitive resources and courses of action required to manage in everyday difficult listening environments (Jennings et al., 2014). It contains 20 situational questions and instructs participants to rate their ability to hear and their confidence levels in handling particular situations. The psychometric properties of the SESM-Q were obtained in a study of 338 adult patients with hearing loss. It was found to have high internal consistency and reliability, and good content validity (Jennings et al., 2014).

2.1.4 Self-Efficacy for Tinnitus Management Questionnaire

The Self-Efficacy for Tinnitus Management Questionnaire (SETMQ) contains 40 items that probe adults' self-efficacy in tinnitus management (Smith & Fagelson, 2011). It consists of five subscales in the areas of routine tinnitus management, emotional response to tinnitus, internal thoughts and interactions with others, tinnitus concepts, and use of assistive devices. The psychometric properties of the SETMQ were obtained in a study of 199 adult patients with tinnitus. It was found to have good internal consistency and reliability, and it was validated against other tinnitus-related measures (Smith & Fagelson, 2011).

2.2 Available Measures to Review when Developing a Questionnaire for Adolescents with Disabilities

A review of the literature involving child and adolescent measures of activity limitation or participation restriction revealed measures associated with disabilities, including audiology-related. The psychometric properties of some of these tools have been assessed to determine validity and reliability. The audiology-based questionnaires focus on identifying and improving the ability of children and youth, with and without hearing loss, to hear and understand in various listening situations through self- and parent-rated measures. The questionnaires that incorporate aspects of activity, participation, and environmental factors as indicated in the ICF models are used to assess and enhance individuals' ability, level, and enjoyment of participation. Table 2-2 provides a summary of the measures found that may be used to facilitate the development of an adolescent self-efficacy questionnaire for individuals with hearing loss.

Table 2-2. Summary of Measures for Use with Children with Hearing Loss and Other Disabilities.

Questionnaire Name and Abbreviation	Description					Reference
	Number of Items	**Response Format**	**Scoring Format**	**Age Range**	**Factors Assessed**	
Child Audiology Measures						
Children's Home Inventory for Listening Difficulties (CHILD)	15	- Self- and parent-report versions - 8-point scale: (1) huh?; (2) tough going; (3) sometimes get it, sometimes don't; (4) it takes work but usually can get it; (5) okay but not easy; (6) pretty good; (7) good; (8) great	- Total and average scores	- 3-12 - With hearing loss	- Communication needs at home and functional benefits of new hearing aids / assistive listening devices within the home communication environment	(Anderson & Smaldino, 2000)
Client Oriented Scale of Improvement for Children (COSI-C)	3-5	- 5-point scale	- Degree of change - Overall average	- >0	- Parent-defined goals - Measure improvements in hearing ability by focusing on individual needs when designing rehabilitation program	(National Acoustic Laboratories [NAL], 2000)*
Hearing Environments And Reflection on	26	- 5-point scale: never, rarely, sometimes,	- Total and subscale scores	- 7-12	- Hearing ability and quality of life over 3 subscales:	(Umansky, Jeffe, & Lieu, 2012;

Quality of Life (HEAR-QL)		often; almost always			- Environments, activities, feelings	Rachakonda et al., 2014)*
	28			- 13-18	- Hearing ability and quality of life over 4 subscales: - Hearing situations, social interactions, school difficulties, feelings	
Child Disability Measures						
Brief Multidimensional Student's Life Satisfaction Scale (BMSLSS)	6	- Self-report - 7-point scale: Terrible, unhappy, mostly dissatisfied, mixed, mostly satisfied, pleased, delighted	- Total score	- 8-18	- Satisfaction with: Family life, friendships, school experiences, self, living environment and overall life	(Seligson, Huebner, & Valois, 2003)*
Children's Assessment of Participation and Enjoyment (CAPE)	55	- Self-report - Each dimension is scored differently: Yes / No; 7-point scale; 5-point scale; 6-point scale; 5-point scale	- Total and subscales averages	- 6-21 - With and without disabilities	- 5 dimensions of participation: Diversity and intensities in activities; with whom and where activities are done; Enjoyment - Five activities:	(King et al., 2007)*

					Recreational, physical, social, skill-based, self-improvement	
Measure of Environmental Qualities of Activity Settings (MEQAS)	32	- Observer-rated - 7-point scale	- Subscale averages	- Youth - With and without disabilities	- 6 subscales: Opportunities for social and physical activities Pleasant physical environment Opportunities for choice and personal growth, and to interact with adults	(King et al., 2014a)*
Participation and Environment Measures for Children and Youth (PEM-CY)	25	- Parent-report - 8-point scale - 5-point scale - 6-point scale - 4-point scale	- Overall and subscale scores	- 5-17 - With and without disabilities	- Participation and environment across home, school, and community	(Coster, Law, & Bedell, 2010)*
Self-reported Experiences of Activity Settings (SEAS)	22	- Self-report - 7-point scale	- Subscale averages	- Youth - With and without disabilities	- 5 subscales: - Personal growth - Psychological engagement - Social belonging - Meaningful interactions - Choice & control	(King et al., 2014b)*
Other						

Generalized Self-Efficacy Scale	10	- Self-report - 4-point scale: (1) not at all true (2) hardly true (3) moderately true (4) exactly true	- Total score	- Adults and adolescents ages 12+	- General sense of perceived self-efficacy in coping with daily hassles and adaptation after experiencing stressful life events	(Schwarzer & Jerusalem, 1995)*

*Signifies questionnaires that have been validated

2.2.1 Children's Home Inventory for Listening Difficulties

The Children's Home Inventory for Listening Difficulties (CHILD; Anderson & Smaldino, 2000), is a family-centered instrument which aims to reveal communication needs of children at home. It is completed by a family member of a child with hearing loss between the age of 3 and 12 years-old. Depending on the child's level of maturity and comprehension, a modified version of the survey can be administered to a child at least 7-years-old by an audiologist. In either case, the CHILD consists of 15 situational questions consisting of a brief description and inquiry of the difficulty the child seems to have in hearing and understanding the family member. The inventory contains an eight-point scale, referred to as the 'Understand-O-Meter', to help the rater appropriately evaluate each question; 1 represents that the child missed the message and 8 indicates that the child heard and understood everything. The CHILD aims to assess the functional benefits of new hearing aids and / or assistive listening devices within the home communication environment. It also serves as a counseling tool for parents to alert them to difficult listening situations and strategies to help accommodate their child (Anderson & Smaldino, 2000). The CHILD is reported to have excellent conceptual clarity, and good retest reliability (Bagatto, Moodie, Seewald, Bartlett, & Scollie, 2011). It lacks information on discriminant validity, and has weak or not confirmed criterion-related validity (Bagatto et al., 2011).

2.2.2 Client Oriented Scale of Improvement for Children

The Client Oriented Scale of Improvement for Children (COSI-C; NAL, 2000) is a measure that helps clinicians document parent-defined goals for children with hearing loss of any age. Similar to the adult version of the COSI-C, its two-phase design allows parents and audiologists to identify specific goals and strategies to pursue related to the child's hearing and / or hearing instruments. At a later, pre-determined review date, audiologists and parents revisit these objectives by measuring their degree of change (no, small, or significant change) as well as whether the goal was achieved. It is noted however, that since the goals and needs of children are likely to be more diverse than those of adults, it is much more difficult to utilize the degree of change and final ability

scales of the COSI-C (NAL, 2000). There is a lack of information on the reliability and validity of this measure, although it is reported as a tool that evaluates specific and realistic environments (Bagatto et al., 2011).

2.2.3 Hearing Environments And Reflection on Quality of Life Questionnaires

Through the use of focus group sessions involving children and adolescents aged 7 to 17 years-old and their parents, the effects of hearing loss on the quality of life (QOL) of youth was investigated (Umansky, Jeffe, & Lieu, 2012). Five child- and adolescent-related domains of QOL were identified and used to categorize the information obtained from the focus groups: (1) school / education, (2) social, (3) emotional, (4) physical, and (5) overall well-being / future. The result of this work was the development of the Hearing Environments And Reflection on Quality of Life (HEAR-QL) questionnaires for children and adolescents (Umansky et al., 2012), which meet the need for well-validated hearing-related QOL instruments to assess children and adolescents with hearing loss.

The validity, reliability, and factor structure of the original 35-item HEAR-QL for children 7-12 years-old has since been assessed (Umansky et al., 2012). Nine of the original 35 items were eliminated for redundancy to produce the HEAR-QL-26, which was concluded to be a valid, reliable and sensitive questionnaire for children with hearing loss. The adolescent HEAR-QL questionnaire for ages 12-17 years has also been assessed for validity, discriminative ability, and reliability; and has been reduced to 28 items of age-related QOL issues (Rachakonda et al., 2014). The adolescent form includes declarative statements, whereas the child form (HEAR-QL-26) contains questions. Compared to other validated, generic health-related QOL questionnaires, including the generic pediatric QOL questionnaire (PedsQL), the HEAR-QL-26 and HEAR-QL-28 were found to be better at discriminating between children with and without hearing loss, and children with hearing loss who wear and do not wear hearing devices (Umansky et al., 2012; Rachakonda et al., 2014). Each HEAR-QL version has also revealed that adolescents with hearing loss experience significantly poorer hearing-related QOL than their normal hearing peers (Umansky et al., 2012; Rachakonda et al., 2014).

2.2.4 Brief Multidimensional Student Life Satisfaction Scale

The BMSLSS measures perceived quality of life with respect to key, specific life domains. The brief, six-item questionnaire assess the satisfaction of children aged 8 to 18 with their family life, friendships, school experiences, self, living environment, and overall life. A seven-point scale is used: terrible, unhappy, mostly dissatisfied, mostly satisfied, pleased delighted. Higher scores indicate higher satisfaction (Seligson, Huebner, & Valois, 2003). The BMSLSS has been validated and shown to have good to excellent reliability (Seligson et al., 2003) and test-retest reliability (Funk, Huebner, & Valois, 2006). It also has been shown to be suitable for use with adolescents who have chronic health conditions for which rehabilitation services are provided. Therefore the BMSLSS may be reliability and validly be used with youth with health conditions including communication disorders given that they have the cognitive ability to understand the questions and response answers (McDougall, Wright, Nichols, & Miller, 2013).

2.2.5 Children's Assessment of Participation and Enjoyment & Preferences for Activities of Children

The Children's Assessment of Participation and Enjoyment (CAPE; King et al., 2004) is a 55-item self-reported questionnaire for children and youth between 6 and 21 years-old, with and without disabilities. It focuses on everyday recreation and leisure activities outside of school over five dimensions of participation, including diversity, intensities, with whom, where, and enjoyment. The Preferences for Activities of Children (PAC) is a supplementary survey, which assesses preference for an activity as a sixth dimension. These tests also provide three levels of scoring: overall participation scores; domain scores reflecting participation in formal and informal activities; and scores reflecting participation in five types of activities, including recreational, active physical, social, skill-based, and self-improvement activities. Items on the CAPE and PAC contain pictures, rating scales, and various degrees of happy faces to provide the child with response alternatives and to enhance understanding of the questions.

The CAPE / PAC manual reports evidence of test-retest reliability, internal consistency and factor structure of the measures (King et al., 2004). These tools' activity type scores have also been involved in more extensive analysis of construct validity in a study involving 427 children with physical disabilities between 6 and 15 years-old (King et al., 2007). Results revealed that intensity, enjoyment, and preference scores were significantly correlated with environmental, family, and child variables, as expected by the researchers. The mean scores for differences between boys and girls, and among various age groups were also consistent and supported by the researchers' predictions. Therefore, this information substantiated the construct validity of the CAPE / PAC measures (King et al., 2007).

The CAPE has also been used in a study comparing participation patterns among children with visual and hearing impairments as well as their normal developing peers (Engel-Yeger & Hamed-Daher, 2013). Results revealed that typically developing children showed significantly different participation behaviour than children with visual and hearing impairments; the latter group was associated with lower number of activities, lower participation intensity, and more activities performed at home and with someone else. Children with visual impairments displayed more limited participation relative to the hearing impaired children. This study illustrates that the ICF-based measures such as the CAPE are sensitive to the participation of children with hearing loss and therefore useful tools to consider.

2.2.6 Participation and Environment Measures for Children and Youth

The Participation and Environment Measures for Children and Youth (PEM-CY; Coster, Law, & Bedell, 2010), is a parent-report instrument of children and youth 5-17 years-old, with and without disabilities. It consists of 25 activities that examine participation and environmental factors across home, school, and community settings. With regards to participation, it explores the frequency, extent of involvement, and desire for change in activities; it also focuses on the factors and activity demands as well as the resource availability and adequacy of a particular environment (Coster et al., 2012). The PEM-CY helps to provide a better understanding of the participation of children and young people

and the impact of environmental factors on their participation. Its psychometric properties of reliability and validity have also been examined in a study containing 576 caregiver respondents (Coster et al., 2011). The study revealed that the PEM-CY demonstrated significant differences on all participation and environmental scales between groups with and without disabilities, as well as internal consistency and test-retest reliability (Coster et al., 2011).

2.2.7 Self-reported Experiences of Activity Settings & Measure of Environmental Qualities of Activity Settings

The discussion of the next two questionnaires involves examining youth experiences and environmental qualities of 'activity settings'; which refer to particular places in which children and youth 'do things' (King, Rigby, Batorowicz, 2013, pg 1578). An activity setting is more precisely described as "a conceptual unit of analysis encompassing both subjective experiences and the objective perception of observable features and the production of common experiences that could arise from engaging in an activity occurring at a particular time and place" (King et al., 2013, pg 1578).

The Self-reported Experiences of Activity Settings (SEAS) is a 22-item self-report measure for all youth with at least a grade three level of language comprehension, with and without disabilities (King et al., 2014b). It contains five subscales that explore the experiences of community and home leisure activity settings: personal growth, psychological engagement, social belonging, meaningful interactions, and choice and control. Raters are provided with two opposing statements of their feelings, one on either end of a seven-point scale. The children and youth are asked how much they agree with either statement by choosing agree a little, agree, or strongly agree. The closer they place their answer to a statement, the more they agree with it. Raters also have the option of selecting neither, or not applicable if the feeling does not make sense with their activity. The SEAS is used to obtain a greater understanding of situation-specific experiences of youth participating in various types of recreation and leisure activity settings. The psychometric properties (internal consistency and test-retest reliability) of the SEAS have been reported (King et al., 2014b) indicating that it purports to appropriately measure the experiences of activity.

The Measure of Environmental Qualities of Activity Settings (MEQAS), is a 32-item observer-rated measure of activity setting qualities for youth, with and without disabilities (King et al., 2014a). It explores the aesthetic, physical, social, and opportunity related qualities of leisure activity settings. It contains six subscales, which examine opportunities for social and physical activities, pleasant physical environment, and opportunities for choice and personal growth, and to interact with adults. Raters are provided with a seven-point scale to express the extent of the agreement with each statement of the measure, ranging from 7 (very great extent) to 1 (not at all). Research has shown that the MEQAS has a sound structure and preliminary evidence of internal consistency, inter-rater, and test-retest reliability (King et al., 2014a). The researchers acknowledge that further work assessing the psychometric properties of the MEQAS is required (King et al., 2014a).

In conclusion, the four above-mentioned scales (CAPE, PEM-CY, SEAS, and MEQAS) involve the concepts of participation and environmental factors as included in the ICF framework (WHO, 2001), and more specifically the child and youth version (WHO, 2007). A brief analysis of these questionnaires allows the comparison of their various characteristics. For instance, there are various environments in which participation is assessed among the measures. The target level of language comprehension and understanding, inclusion of visual representations of scenarios, and feelings elicited during activities and the types of rating scales also differed. Some surveys involved a child or youth self-report, while others required a parent or observer complete the measure.

2.2.8 Generalized Self-Efficacy Scale

The Generalized Self-Efficacy Scale (GSE; Schawarzer & Jerusalem, 1995) is a 10-item self-report scale designed for the general adult population including adolescents, ages 12 years and older. It aims to assess the general sense of perceived self-efficacy to predict the coping abilities of individuals with daily difficulties, as well as their adaptations after experiencing various types of stressful life events. The Generalized Self-Efficacy Scale is available in 33 languages and is used worldwide with various populations with health conditions (Scholz, Gutiérrez-Doña, Sud, & Schwarzer, 2002). The GSE has been shown

to have good to excellent internal consistency and test-retest reliability (Scholz et al., 2002). Due to its approach of assessing an individual's *general* self-efficacy, the GSE is likely not a good scale to model when probing the self-efficacy of adolescents across various *specific* adolescent-related activities.

2.3 Conclusion

Overall, each questionnaire possessed a unique collection of characteristics and qualities reflected in its items. However, these inventories do not seem to have achieved our goal of identifying a questionnaire with items to measure self-efficacy beliefs in adolescents with hearing loss. It is important for our questionnaire to encompass a wide range of appropriate activities across various settings. Therefore, a review of the literature describing adolescent-appropriate activities and environments in order of importance was undertaken.

Chapter 3

3 ADOLESCENT SELF EFFICACY QUESTIONNAIRE – HEARING LOSS (ASEQ-HL)

3.1 Methods

3.1.1 Adolescent-related Activities

3.1.1.1 Review of the literature

Google Scholar, CINAHL, MEDLINE, and PubMed were used to find literature that provided a comprehensive list of activities that typically-developing adolescents participate in. The aim was to develop an evidence-based list of everyday activities in which adolescents spend their time, regardless of their hearing acuity. This review provided lists of activities, however most of the attention of these articles was focused on patterns and durations of time that teens participated in unhealthy activities, such as drug use and absence from school. A continued search led to one article in the transportation literature that examined the travel patterns and time allocations of children's activities (Copperman & Bhat, 2007). Additional articles were found by checking the references from the Copperman and Bhat (2007) article as well as articles that cited Copperman and Bhat (2007). A secondary aim was to document time spent in each of these activities. In the end, we identified 15 activity-related articles and these were used to derive a list of 21 activities items (see Table 3-1). For clarification, the activities from the literature review are referred to as "activity items" from which additional "questionnaire items" were derived and developed to be included in the Adolescent Self-Efficacy Questionnaire for Hearing Loss (ASEQ-HL). For each activity item, the amount of time which adolescents spent participating was recorded from each article reviewed. Then an average of the time-spent for each activity item was calculated, to ensure that there was agreement among the articles and as an indicator of importance in adolescents' daily lives. The resultant activity items were categorized according to the type of activity as well as where these activities took place.

3.1.1.2 Activity Items Development

The compilation of activities for inclusion in the Activities Self-Efficacy Questionnaire for Adolescents with Hearing Loss (ASEQ-HL) was developed based on the review of adolescent-related activity literature. The aim was to provide an inventory of a wide range of activities in which adolescents spend their time, regardless of their hearing capability. For clarification, the activities from the literature review are referred to as "activity items" from which additional "questionnaire items" were derived and developed to be included in the ASEQ-HL.

For each activity item, the amount of time in which adolescents spent participating was recorded from each article reviewed. Then an average of the time-spent amounts for each activity item was calculated, to ensure that there was agreement among the articles and as an indicator of importance in adolescents' daily lives. The resultant activity items were categorized according to activity type.

3.1.1.3 Linking Activity Items to ICF-CY

The activity items were linked to ICF-CY codes according to recommendations described in Granberg, Möller, Skagerstrand, Möller, and Danermark (2014). The aim of linking the activities to the ICF-CY was to describe the list of activities from the ICF perspective. The focus was on linking the activity list compiled from the literature review to the most relevant ICF component, "activity and participation". The ICF-CY was used as a guide to list as many relevant codes and categories to the list of activity items from the literature review. For example, watching television (TV) and / or movies was linked to the ICF code, d110 – watching, d115 – listening, and d310 – communicating with – receiving – spoken messages. Some activities were linked to only one ICF-CY code / category, while other activities were linked to several ICF-CY codes / categories. One activity was not listed in the ICF-CY, so the appropriate ICF code / category was linked (sleep was linked to d569 – sleeping in the ICF, which is not included in the ICF-CY). Other activities were linked to the "environment factor" component of the ICF-CY (for example, personal business was linked to e535 – communication services, systems and policies; and e560 – media services, systems and policies. This initial linking was carried out by the first

author and was reviewed by a second audiologic researcher. The ICF provided a framework for the researchers to divide activity items into more specific, adolescent-related tasks (for example, social activities was divided into friend / peer-related, family-related and social media; see Table 3-1).

3.1.2 Adolescent Self-Efficacy Questionnaire (ASEQ) Development

3.1.2.1 Questionnaire Items

The items included in the ASEQ-HL were developed based on the list of activity items and the linked ICF-CY categories. The questionnaire items were either directly related to the activity item, in that they were a rephrased statement of the activity item, or a branched example of an activity item that was otherwise too broad to accurately capture that activity as it relates to adolescents and / or those with hearing loss. The wording and descriptions of these items were also guided by the wording and descriptions of the ICF-CY, as well as the CAPE questionnaire items (King et al., 2004). The activities in each ASEQ-HL questionnaire item began with a present tense verb and were accompanied by an example of what that activity can include (e.g.,, ‘travelling on public transportation – for example: city or school bus, or subway”).

3.1.2.2 Self-efficacy Questionnaire Guidelines

The wording of the statements included in the ASEQ-HL that prefaced each questionnaire item were constructed using perceived self-efficacy (PSE) guidelines proposed by Bandura (2006b). Bandura’s guidelines ensure that items are consistent with the self-efficacy theory and include recommendations on phrasing the items, response scale format, gradations in challenge, practice items, and respondent instructions (Smith & Fagelson, 2011). A 10-unit interval response scale format was followed and used to assess respondents’ certainty of PSE to managing communication and / or the listening environments from 0% (cannot do at all) to 100% (always can do). Each ASEQ-HL statement was accompanied by an open-ended comment section that asked participants to elaborate on their responses.

Instructions were included at the beginning of the ASEQ-HL to assist adolescent participants with understanding how to complete the questionnaire. To ensure ease of completion, researchers had an adolescent (aged 11 years) with hearing loss review the instructions and to make suggestions for changes. The wording of the items became simpler (e.g., 'waking up independently' was changed to 'waking up on your own', the response expectations clearer (the comment section was made into a follow up question on 'what is easy or difficult about managing communication during this activity' rather than as a statement as part of the overarching self-efficacy question), and relevant examples were added to elaborate on the task of evaluating self-efficacy (e.g., the instructions included the example of using an FM system in school to demonstrate a way of managing communication). The instructions were followed by two practice questions asking participants to rate their self-efficacy in completing simple tasks that are unrelated to the ASEQ-HL items. The first practice question contained an easy task to complete and preceded a relatively more difficult task to provide researchers or clinicians with an evaluative tool to ensure that the participants understood the task before proceeding. The wording and examples of the practice questions were also reviewed by field experts and adolescents to ensure appropriateness and ease of task understanding.

3.1.2.3 Expert Review of the ASEQ-HL

Throughout the development of the ASEQ-HL, initial activity items, questionnaire statement and item wording and measurement scales were evaluated by various experts: four adolescents, two with hearing loss (11 and 23 years-old) and two with normal hearing (13 and 15 years-old); field experts including Audiologic researchers and clinicians; and an expert in formatting self-efficacy questionnaires.

The adolescents were provided with the first draft of the questionnaire, which included the instructions, the rating scale as well as the list of questionnaire items. In interview-type sessions, the adolescents were tasked with completing the questionnaire. They were also asked to comment on the ease and / or difficulty in comprehending and completing the questionnaire and record the amount of time spent to complete the questionnaire. Once appropriate revisions were made to the questionnaire based on consideration of their feedback, the adolescents were asked to complete and comment on the

questionnaires independently. The aim of having adolescent reviewers was to reduce response burden with respect to time and effort, enhance the understanding of the task, as well as ensure relevance of all items included to adolescents with and without hearing loss. The wording of the inventory was modified until the youngest person with hearing loss could independently complete the questionnaire within approximately 30 minutes.

3.2 Results and Discussion

The results of the adolescent-related activities literature review are described below and displayed in Table 3-1. The derived list of 35 activities included in the ASEQ-HL are grouped into the following categories: (a) personal life activities (n=4), (b) school-related activities (n=4), (c) non-structured recreational activities (n=11), social activities (n=8), and organized activities (n=6). Table 3-2 displays the ICF codes linked to each of the activities. The categorization and descriptions of these activities are provided in Table 3-3. The resulting initial ASEQ-HL questionnaire (see Appendix 1) consists of these 35 items. Respondents use an 11 point Likert scale [0% (cannot do at all) to 100% (always can do] and a 'not applicable' option to 'rate how certain you are right now that you can manage communication and / or the listening environment in each activity' (see Appendix 1). They also are asked to comment on 'what is easy or difficult about managing communication during this activity'.

Table 3-1. Content Analysis of the Literature Review of Adolescent-Related Activities.

	PERSONAL LIFE					**SCHOOL-RELATED**		**NON-STRUCTURED RECREATIONAL**								**SOCIAL**			**ORGANIZED**		
	Personal Care	**Sleep**	**Housework / Chores**	**Personal Business**	**Meals**	**School**	**Studying / Reading**	**Hobbies**	**TV / Movie watching**	**Physical Activities**	**Video / Computer Games**	**Reading**	**Relaxing / Free time & Play**	**Travel**	**Music / Drama**	**Family-related**	**Social Media**	**Friends / Peer-related**	**Organized Activities**	**Religion**	**Paid Work**
(Zill, Nord, & Loomis, 1995)						✓	✓	✓	✓	✓		✓						✓			✓
(Wolfson & Carskadon, 1998)		✓																			
(Hofferth & Sandberg, 2001)	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓		✓	✓		✓	✓	✓	✓
(Larson, 2001)			✓				✓		✓	✓			✓					✓	✓		✓
(Shann, 2001)			✓				✓		✓	✓	✓	✓			✓			✓	✓		✓
(Bartko & Eccles, 2003)			✓				✓		✓			✓						✓	✓	✓	✓
(Gross, 2004)																	✓				

(Barnes, Hoffman, Welte, Farrell, & Dintcheff, 2006)							✓		✓	✓	✓		✓	✓		✓	✓		✓	✓	✓
(Copperman & Bhat, 2007)	✓			✓	✓	✓	✓		✓	✓	✓	✓		✓	✓				✓	✓		✓
(Schonert-Reichl, Buote, & Jaramillo, 2007)							✓		✓		✓	✓		✓		✓	✓		✓			
(Selfhout, Branje, Delsing, ter Bogt, & Meeus, 2009)																	✓					
(Roberts, Foehr, & Rideout, 2005)			✓			✓	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓			✓
(Bradley & Inglis, 2012)				✓					✓			✓				✓			✓	✓		
(Lenhart, 2012)																	✓					
(Adolfsson, 2013)	✓	✓	✓		✓	✓			✓	✓	✓	✓		✓								

Table 3-2 Adolescent-Related Activities Linked to ICF Codes.

PERSONAL LIFE					SCHOOL-RELATED		NON-STRUCTURED RECREATIONAL								SOCIAL			ORGANIZED		
Personal Care	**Sleep**	**Housework / Chores**	**Personal Business**	**Meals**	**School**	**Studying / Homework**	**Hobbies**	**TV / Movie watching**	**Physical Activities**	**Video / Computer Games**	**Reading**	**Relaxing / Free Time & Play**	**Travel**	**Music / Drama**	**Family-related**	**Social Media**	**Friends / Peer-related**	**Organized Activities**	**Religion**	**Paid Work**
d230	d569	d630	d220	d550	d740	d166	d920								d9205			d910	d930	d132
d510		d640	d230	d560	d820	d820	d9204	d110	d9201		d9202	d880	d470	d115	d760	d310	d132	d835		d220
d520			d325		d835			d115	d455			d9200	d475	d9202		d325	d220	d855		d840
d530			d620					d310								d345	d310	d9201		d845
d540			d860 + d865													d360	d315			d850
d570			e535													d3600	d335			d740
																d750	d350			
																	d355			
																	d710 + d720			
																	d730			
																	d750			
																	d770			

Table 3-3. ASEQ-HL Items, Categorization by Activity Type, and Expanded Item Descriptions (Copyright 2015).

Activity Type	Item	Expanded Item Description*
PERSONAL LIFE	1. Taking care of yourself	includes personal care and hygiene
	2. Waking up on our own	
	3. Helping out around the house	includes doing chores and house work on a regular basis, such as taking out the garbage, cutting the grass, making meals and / or folding laundry
	4. Shopping	includes shopping on-line or in store for groceries, clothing or other items
SCHOOL-RELATED	5. Learning at school	includes all school work and activities involved in gaining education during school hours, such as reading, writing, and presenting
	6. Doing homework	includes work required for school but completed outside of school hours
	7. Reading aloud in class	
	8. Participating in school clubs	includes extra-curricular clubs such as chess, science, book, yearbook, social, and / or athletic
NON-STRUCTURED RECREATIONAL	9. Doing hobbies	including puzzles, playing board / card games, crafts, drawing, colouring, collecting things, etc
	10. Watching TV or movies	
	11. Doing individual physical activities	includes jogging, working out, yoga, and rock climbing, skipping rope, swimming, gymnastics, casually playing with a ball on one's own.
	12. Playing video / computer / internet games	
	13. Listening to music	
	14. Playing a musical instrument	

	15. Singing on your own (“solo”)	
	16. Singing in a group	
	17. Swimming with friends at a beach or pool party	
	18. Riding a bike	
	19. Using public transportation	includes a city or school bus, or subway
	20. Driving a vehicle	Includes travelling in a car or any other motor vehicle (motorcycle); and includes being a front-seat or back-seat passenger
	21. Travelling as a passenger in a vehicle	Includes travelling in a car or any other motor vehicle (motorcycle); and includes being a front-seat or back-seat passenger
SOCIAL	22. Using social networks like Facebook and Twitter	
	23. “Texting” / “Instant messaging”	
	24. Writing emails	
	25. Talking on the phone	includes talking to others on a home phone, cell or pay-phone
	26. Going to a party	includes birthday parties, reunions, weddings, graduations, and other celebrations
	27. Hanging out with friends	includes spending time with friends with no specific activity planned
	28. Hanging out with parents and family	includes spending time with parents or other family members with no specific activity planned
	29. Visiting other people	includes going to someone's house for a meal or sleepover
ORGANIZED	30. Playing sports	includes team and non-team sports
	31. Doing a religious activity	includes praying, mediating, attending a place of worship and / or religious class outside of the school curriculum

	32. Doing a paid job	includes work at restaurants, stores, or community centres that is done for hire or profit
	33. Doing volunteer work	includes activities volunteered for without pay
	34. Participating in youth groups / community organizations	includes Scouts or Girl Guides
	35. Taking lessons	includes lessons with an instructor, such as in music, singing, dancing, swimming, martial arts, language, educational, tutoring, etc

*Expanded Item Descriptions were included in the questionnaire and accompanied the corresponding questionnaire item to provide brief examples and explanation of the items included in the questionnaire. These descriptions are not exhaustive, rather they were meant to guide the subject while completing each question. The descriptions are compiled based on the feedback from the adolescents' review and the CAPE manual (King et al., 2004).

3.2.1 Personal Life Activities

The ‘Personal Life’ category, specifies adolescent related activities of personal care, sleep, household work / chores, personal business, and meals.

3.2.1.1 Personal Care

Adolfsson (2013) identifies hygiene as an everyday living situation for children between 0 to 17 years-old in her study of children’s participation. Reportedly adolescents can spend on average 1 hour per day on some type of personal care (Hofferth & Sanberg, 2001; Copperman & Bhat, 2007).

The ‘personal care’ item was linked to the following ICF-CY codes and categories: (1) d230 – carrying out daily routine; (2) d510 – washing oneself; (3) d520 – caring for body parts; (4) d530 – toileting; (5) d540 – dressing; and (5) d570 – looking after one’s health. The corresponding ASEQ-HL questionnaire item is "taking care of yourself", described as including personal care and hygiene.

3.2.1.2 Sleep

Sleep is also considered an everyday life situation for adolescents (Adolfsson, 2013). Adolescents sleep approximately 7.5 to 9.5 hours nightly, with decreasing durations among younger adolescents and during weeknights (Wolfson & Carskadon, 1998; Hofferth & Sanberg, 2001).

This item was linked to d569 – sleeping code in the ICF. Sleep is not included in the ICF-CY component activity and participation, rather described in the component body functions. However, Adolfsson (2013) describes sleep as an activity and links it within the category Self-care (d569). The corresponding ASEQ-HL questionnaire item is “waking up on your own.” Probing the ability and confidence of adolescents with hearing loss to independently wake up is important as they typically do not wear their hearing instruments while sleeping.

3.2.1.3 Housework / Chores

Adolescents participate in household work and chores (Shann, 2001; Bartko & Eccles, 2003; Roberts, Foehr, & Rideout, 2005) for approximately 20 – 60 minutes per day (Hofferth & Sanberg, 2001; Larson, 2001).

This item was linked to d630 – preparing meals and d640 – doing housework codes in the ICF-CY. The corresponding ASEQ-HL questionnaire item is "helping out around the house" which is described to include doing chores and house work on a regular basis, such as taking out the garbage, cutting the grass, making meals, and / or folding laundry.

3.2.1.4 Personal Business

Adolescents participate in personal business activities including obtaining services, such as going to the doctor, shopping, getting their hair cut / styled, using a computer to write emails, or paying bills; with the more complex activities performed by older adolescents (Copperman & Bhat, 2007; Bradley & Inglis, 2012). On average adolescents participate in personal business for approximately 1 hour per day, with slightly higher durations on the weekends (Copperman & Bhat, 2007).

This item was linked to d220 – undertaking multiple tasks, d230 – carrying out daily routines, d325 – communicating with – receiving – written messages, d620 – acquisition of goods and services, d860 and d865 – basic and complex economic transactions, and e535 – communication services, systems and policies codes in the ICF-CY. The corresponding ASEQ-HL questionnaire item is "shopping" which is described to include includes shopping on-line or in store for groceries, clothing or other items. Shopping is often challenging to adolescents with hearing loss because it typically involves environments with background noise as well as communicating with strangers.

3.2.1.5 Meals

Eating and drinking are everyday life situations (Adolfsson, 2013) and engage adolescents for approximately 1 hour per day, with slightly higher durations on the weekends (Hofferth & Sanberg, 2001; Copperman & Bhat, 2007).

This item was linked to d550 – eating and d560 – drinking codes in the ICF-CY. There was no direct corresponding questionnaire item developed related to participation in meals because it is likely reflected in participation in family-related or peer-related relationship items already included in the ASEQ-HL questionnaire.

3.2.2 School-Related Activities

Within ‘School-related activities’, adolescents participate in activities related to school and studying and reading.

3.2.2.1 School

School and formal education are important and time-consuming adolescent-related activities (Adolfsson, 2013). Adolescents can spend approximately 7 hours per weekday at school (Zill, Nord, & Loomis, 1995; Hofferth & Sanberg, 2001; Copperman & Bhat, 2007).

This item was linked to d740 – formal relationship, d820 – school education, and d835 – school life and related activities codes in the ICF-CY. The corresponding questionnaire items are “learning at school” which is described to include all school work and activities involved in gaining education during school hours, such as reading, writing, and presenting. This is especially important for students with hearing loss because of the demanding and dynamic environments in a classroom, including multiple speakers and background noise. “Participating in school clubs”, is described to include extra-curricular clubs such as chess, science, book, yearbook, social, and / or athletic, and is another school-related questionnaire item.

3.2.2.2 Studying / Reading

Other academic activities including studying, reading and homework are also important activities that adolescents can spend about 40 minutes per day doing (Zill et al., 1995; Larson, 2001; Shann, 2001; Bartko & Eccles, 2003; Roberts et al., 2005; Barnes, Hoffman, Welte, Farrell, & Dintcheff, 2006; Copperman & Bhat, 2007).

This item was linked to d166 – reading and d820 – school education codes in the ICF-CY. The corresponding questionnaire items developed are “reading aloud in class” and “doing homework”, which is described to include work required for school but completed outside of school hours.

3.2.3 Non-Structured Recreational Activities

Within the ‘Non-structured recreational activities’ category, adolescents participate in hobbies, TV or movie watching, physical activities, video or computer games, free play, reading, relaxing and free time, travel, and music or drama.

3.2.3.1 Hobbies

Adolescents can spend approximately 1 hour per day pursuing hobbies (Zill et al., 1995; Hofferth & Sanberg, 2001; Roberts et al., 2005; Barnes et al., 2006; Copperman & Bhat, 2007; Adolfsson, 2013).

This item was linked to d920 – recreation and leisure and d9204 – hobbies codes in the ICF-CY. The corresponding questionnaire item developed is “doing hobbies”, including puzzles, playing board / card games, crafts, drawing, colouring, collecting things, etc.

3.2.3.2 TV / Movie Watching

Approximately 2 hours per day can be spent by adolescents to watch TV, movies or videos; and typically more time is spent on these activities on weekends (Zill et al., 1995; Hofferth & Sanberg, 2001; Larson, 2001; Shann, 2001; Roberts et al., 2005; Barnes et al., 2006; Copperman & Bhat, 2007; Bradley & Inglis, 2012; Adolfsson, 2013).

This item was linked to d920 – recreation and leisure, d110 – watching, d115 – listening, and d310 – communicating with – receiving – spoken messages. The corresponding questionnaire item developed is “watching TV or movies.” This activity is of importance to ask youth with hearing loss as they may struggle with accurately and comfortably hearing the conversations on TV and in movies.

3.2.3.3 Physical Activities (Non-Structured Sports)

Playing non-structured sports, walking, exercising, gardening, and camping are examples of non-structured physical activities that can take up to 0.5 to 1.25 hours of adolescents' daily lives (Zill et al., 1995; Hofferth & Sanberg, 2001; Larson, 2001; Shann, 2001; Roberts et al., 2005; Barnes et al., 2006; Copperman & Bhat, 2007; Adolfsson, 2013).

This item was linked to d920 – recreation and leisure, d9201 – sports, and d455 – moving around. The corresponding questionnaire items developed are "doing individual physical activities", which includes jogging, working out, yoga, and rock climbing, skipping rope, swimming, gymnastics, casually playing with a ball on one's own; and "swimming with friends at a beach or pool party". Because of the electronic nature of hearing instruments, they are generally not water resistant and are not worn while swimming, which becomes a concern for many with hearing loss. Also, adolescents typically complain about moisture build up in their hearing devices from sweating during physical activities.

3.2.3.4 Video / Computer Games

Adolescents can spend approximately 1.25 hours a day on video and computer-related games and activities, and can spend almost double that time on weekends (Shann, 2001; Roberts et al., 2005; Copperman & Bhat, 2007; Bradley & Inglis, 2012; Adolfsson, 2013).

This item was linked to d920 – recreation and leisure. The corresponding questionnaire item developed is "playing video / computer / internet games."

3.2.3.5 Reading for Pleasure

Adolescents can spend approximately 20 minutes a day on reading for pleasure (Zill et al., 1995; Hofferth & Sanberg, 2001; Shann, 2001; Bartko & Eccles, 2003; Roberts et al., 2005).

This item was linked to d920 – recreation and leisure and d9202 – arts and culture. There was not a specific questionnaire item developed corresponding to reading for pleasure, as the previously mentioned item "reading aloud in class" was included. The rationale for

only including one item related to ‘reading’ is because the task is the same, whereas the difference is the environment in which the task takes place. It is likely more appropriate and critical to ask adolescents with hearing loss about their capability to read aloud in class than leisurely, as it is a more dynamic listening environment.

3.2.3.6 Relaxing / Free Time and Play

Approximately 1 hour per day can be spent by adolescents in unstructured relaxing or free time (Barnes et al., 2006; Larson, 2001). They engage in free play approximately 1.25 hours a day, and can spend almost double that time on weekends (Hofferth & Sanberg, 2001; Copperman & Bhat, 2007; Adolfsson, 2013).

This item was linked to d920 – recreation and leisure, d880 – engagement in play, and d9200 – play. There was not a specific questionnaire item developed corresponding to relaxing and free time and play as other non-structured recreational and social activity items covered such broad activities.

3.2.3.7 Travel

Adolescents can spend approximately 1.8 hours a day on passive and active travel, and approximately double that on weekends (Copperman & Bhat, 2007).

This item was linked to d920 – recreation and leisure, d470 – using transportation, and d475 – driving. The corresponding questionnaire items developed were “riding a bike”, “using public transportation”, which includes a city or school bus, or subway, “driving a vehicle”, which includes a car or any other motor vehicle (e.g., a motorcycle), and “travelling as a passenger in a vehicle”, such as a car or any other motor vehicle (e.g., a motorcycle)”. The listening environment in a vehicle is often challenging for individuals with hearing loss. Whether they are passengers or drivers of a vehicle, the noise associated with traffic, the vehicle itself, or the other conversations in the car pose as some challenges for them. Their inability to face the talker is also challenging when maintaining conversations.

3.2.3.8 Music / Drama

Music, art, and drama-related activities can occupy approximately 2 hours of adolescents' daily lives (Shann, 2001; Roberts et al., 2005; Barnes et al., 2006; Bradley & Inglis, 2012).

This item was linked to d920 – recreation and leisure, d115 – listening, d9202 – arts and culture. The corresponding questionnaire items developed are "listening to music", "playing a musical instrument", "singing on your own ("solo")", and "singing in a group". This activity is important because the sound quality and experience of listening to music with hearing instruments is sometimes a concern for individuals with hearing loss.

3.2.4 Social Activities

Within the 'Social activities' category, adolescents engage in activities related to social media, family, and friends.

3.2.4.1 Social Media

Internet use for instant messaging, social media sites, email, and online communication among adolescents is approximately 1.8 to 2.3 hours a day, with more usage as technological advances have been made in more recent years (Gross, 2004; Roberts et al., 2005; Selfhout, Branje, Delsing, ter Bogt, & Meeus, 2009). Reportedly, approximately seventy five percent of teens text (Lenhart, 2012).

This item was linked to d9205 – socializing, d310 – communicating with – receiving – spoken messages, d325 – communicating with – receiving – written messages, dd325 – writing messages, d360 – using communication devices and techniques, d3600 – using telecommunication devices, and d750 – informal social relationships. The corresponding questionnaire items developed are "using social networks like Facebook and Twitter", "Texting / Instant messaging", "writing emails", and "talking on the phone", which includes talking to others on a home phone, cell or pay-phone. Talking on the phone is a particularly challenging task for individuals with hearing loss because of their inability to face the talker (thus missing out on visual cues and lip-reading), and the typical poor sound quality of the telephone device.

3.2.4.2 Family-Related

Adolescents can engage in approximately 2 hours a day in family-related activities, such as household conversations, family time, and hanging out with parents (Hofferth & Sanberg, 2001; Roberts et al., 2005; Barnes et al., 2006).

This item was linked to d9205 – socializing, d760 – family relationships. The corresponding questionnaire item developed is "hanging out with parents and family", which includes spending time with parents or other family members with no specific activity planned. The self-efficacy of adolescents while participating in family-related activities is important to probe because parental self-efficacy perceptions and the home environment are influential on the development of adolescents' self-efficacy.

3.2.4.3 Friends / Peer-Related

Adolescents can also be involved in spending approximately 2 to 3 hours a day on friends and peer-related activities such as going to parties, visiting and talking to friends, hanging out with friends, talking on the telephone, and informal socializing (Zill et al., 1995; Hofferth & Sanberg, 2001; Larson, 2001; Shann, 2001; Bartko & Eccles, 2003; Roberts et al., 2005; Barnes et al., 2006; Copperman & Bhat, 2007; Bradley & Inglis, 2012; Adolfsson, 2013).

This item was linked to d9205 – socializing, d132 – acquiring information, d220 – understanding multiple tasks, d310 – communicating with – receiving – spoken messages, d315 – communicating with – receiving – nonverbal messages, d335 – producing nonverbal messages, d350 – conversations, d355 – discussion, d710 and d720 – basic and complex interpersonal interactions, d730 – relating to strangers, d750 – informal social relationships, and d770 – intimate relationships. The corresponding questionnaire items developed are "hanging out with friends", which includes spending time with friends with no specific activity planned, "going to a party", which includes birthday parties, reunions, weddings, graduations, and other celebrations, and "visiting other people", which includes going to someone's house for a meal or sleepover. The influence of peers during adolescence is significant and contributes to the development of self-efficacy through vicarious experiences. Adolescents with hearing loss may face

challenges communicating in many social settings with peers, especially when there is background noise (such as loud music at parties) or non-familiar talkers (such as at parties or visits).

3.2.5 Organized Activities

Within the ‘Organized activities’ category, adolescents join in activities related to organized activities, religion, and paid work.

3.2.5.1 Organized Activities

Adolescents’ participation in extra-curricular activities, youth group, lessons, meetings, clubs, volunteering and organized sports can be approximately 1.5 hours per day (Hofferth & Sanberg, 2001; Larson, 2001; Shann, 2001; Bartko & Eccles, 2003; Barnes et al., 2006; Copperman & Bhat, 2007; Bradley & Inglis, 2012).

This item was linked to d910 – community life, d835 – school life and related activities, d855 – non-remunerative employment, and d9201 - sports. The corresponding questionnaire items developed are “playing sports”, which includes team and non-team sports, “doing volunteer work”, which includes activities volunteered for without pay, “participating in youth groups / community organizations”, including Scouts or Girl Guides, and “taking lessons”, which includes lessons with an instructor, such as in music, singing, dancing, swimming, martial arts, language, educational, and tutoring. Adolescents with hearing loss may find it challenging to manage their communication during sports, youth groups and lessons because of the dynamic listening environments during these activities.

3.2.5.2 Religion

Adolescents can partake in religious activities including attending places of worship for approximately 0.2 hours a day (Hofferth & Sanberg, 2001; Bartko & Eccles, 2003; Barnes et al., 2006).

This item was linked to d9330 – religion and spirituality. The corresponding questionnaire item developed is “doing a religious activity”, which includes praying,

mediating, attending a place of worship and / or religious class outside of the school curriculum.

3.2.5.3 Paid Work

Adolescents aged 15 years and older can spend approximately 1 hour a day and slightly more on weekends on paid work, such as babysitting, delivering papers or working at a job (Zill et al., 1995; Hofferth & Sanberg, 2001; Larson, 2001; Shann, 2001; Bartko & Eccles, 2003; Roberts et al., 2005; Barnes et al., 2006; Copperman & Bhat, 2007).

This item was linked to d132 – acquiring information, d220 – undertaking multiple tasks, d840 – apprenticeship (work preparation), d845 – acquiring, keeping and terminating job, d850 – remunerative employment, and d740 – formal relationships. The corresponding questionnaire item developed is "doing a paid job", which includes work at restaurants, stores, or community centres that is done for hire or profit. The dynamic listening environments and the constant communication with unfamiliar people at work may pose a challenge for adolescents with hearing loss.

3.3 Challenges with the Adolescent Time Use Review

Some challenges were faced during the compilation of the list of adolescent activities to be included in the ASEQ-HL questionnaire. Several articles used different terms for similar activities, and grouped some activities under different terms that other articles kept separate. Also, since adolescence is a range of years, a variety of categorizations of age were used across articles. This was challenging because activity levels and time spent in each activity differed among young and older adolescents. There were also different ways of measuring time spent in each activity, as some articles differentiated between weekdays and weekend days. Finally, using and calculating averages of the time spent in each activity across the relevant articles reduces the precision of the averaged values. In some cases, such as 'paid work', averaging this activity per day may be inappropriate as it is more likely to occur on weekends rather than on weekdays.

3.4 Conclusion

The purpose of this literature review was to develop a list of adolescent-related activities that could be used to develop a questionnaire to measure the self-efficacious behaviour of adolescents with hearing loss as it relates to the ICF-CY framework of functioning, activity and participation in their everyday lives. Similar to the existing adult SE measures, an adolescent-focused measure will help to identify potential barriers that limit activities and restrict participation and may assist adolescents, caregivers and health-care providers to identify appropriate interventions to positively impact audiologic outcomes. This type of instrument is not currently available and its use will facilitate a more individualized and holistic approach to defining habilitation / rehabilitation goals for intervention. It will also provide audiologists a more in-depth understanding of activity, participation and the limitations and restrictions experienced in everyday life situations for adolescents in their care; as well as a common language for interdisciplinary collaboration and communication. Additional research is currently underway to validate the ASEQ-HL questionnaire. A secondary, and significant contribution of this work is the development of a list of adolescent-related activities that can be used to facilitate the development of additional SE-based questionnaires for adolescents with other disabilities, such as vision loss.

Chapter 4

4 PILOT VALIDATION STUDY OF ASEQ-HL

4.1 Introduction

The ASEQ-HL is novel type of instrument that would facilitate a more individualized approach to defining intervention goals based on identified participation and activity restrictions experienced in everyday life situations for adolescents. The purpose of this project was to pilot this newly developed self-efficacy questionnaire on a sample population of adolescents with hearing loss. The test-retest reliability as well as the construct validity of the ASEQ-HL as compared to the HEAR-QL (Umansky et al., 2012; Rachakonda et al., 2014) and BMSLSS (Seligson et al., 2003) were also assessed. This pilot study will provide an opportunity for an initial trial and examination of the ASEQ-HL and to make recommendations on the implementation of the measure in clinical practice and to suggest types of future analysis that might be performed on a larger sample size.

4.2 Methods

4.2.1 Participants

Subjects were adolescent clients recruited through the Child Amplification Laboratory at The National Centre for Audiology at Western University, London Ontario, the H.A. Leeper Speech & Hearing Clinic at Western University, London Ontario, and the Audiology Clinic at Humber River Hospital in Toronto, Ontario. Eligible subjects with hearing loss were aged 10 to 17 years, 11 months and had normal cognition, as determined by their audiologist or a review of their client files. Eligibility criteria included permanent sensorineural, mixed, or conductive hearing loss with a four frequency (500, 1000, 2000 and 4000 Hz) pure tone average of $\geq$ 30dB hearing level in at least one ear.

4.2.2 Research Procedure

This study was approved by the Western University Health Science Research Ethics Board at the University of Western Ontario, London, Ontario. Written consent was obtained from parents of participants, and written and verbal assent was obtained from all child participants. A release of information form was also obtained to receive audiometric information from the subjects' audiologists.

Figure 4-1 includes a flowchart of the recruitment and data collection process for this study. Upon receiving consent, eligible participants (individuals who were at least 10 years of age with no apparent cognitive impairment in the opinion of their audiologist) were invited to complete three questionnaires online via email. The three questionnaires included the Adolescent Self-Efficacy Questionnaire for Hearing Loss (ASEQ-HL; see Appendix 1), the Hearing Environments And Reflection on Quality of Life (HEAR-QL; Umansky et al., 2012; Rachakonda et al., 2014) and the Brief Multidimensional Student's Life Satisfaction Scale (BMSLSS; Seligson et al., 2003). Each paper version of the questionnaires was put into electronic form in SurveyMonkey®. The participants were instructed to follow the online links to complete all three questionnaires, in any order. Approximately two weeks following the return of the initial ASEQ-HL questionnaire, a second ASEQ-HL questionnaire was sent to participants to assess test-retest reliability. Non-respondents were reminded up to three times, as necessary, to complete the questionnaires. Only the data from subjects with all four completed questionnaires that were matched with their audiograms were analyzed in the study. Participants that did not have internet or computer access were provided with print copies of the questionnaires to complete.

Participants' data were excluded from the analysis if they were unable to complete all four questionnaires, did not meet the age or cognitive-ability criteria, or if they did not understand the practice problems at the beginning of the questionnaire. An indication of understanding the task and successfully responding to the practice questions was to report a higher score to the easier practice question than the more difficult practice question. This ensured that respondents understood the instructions and were familiarized with the response scale.

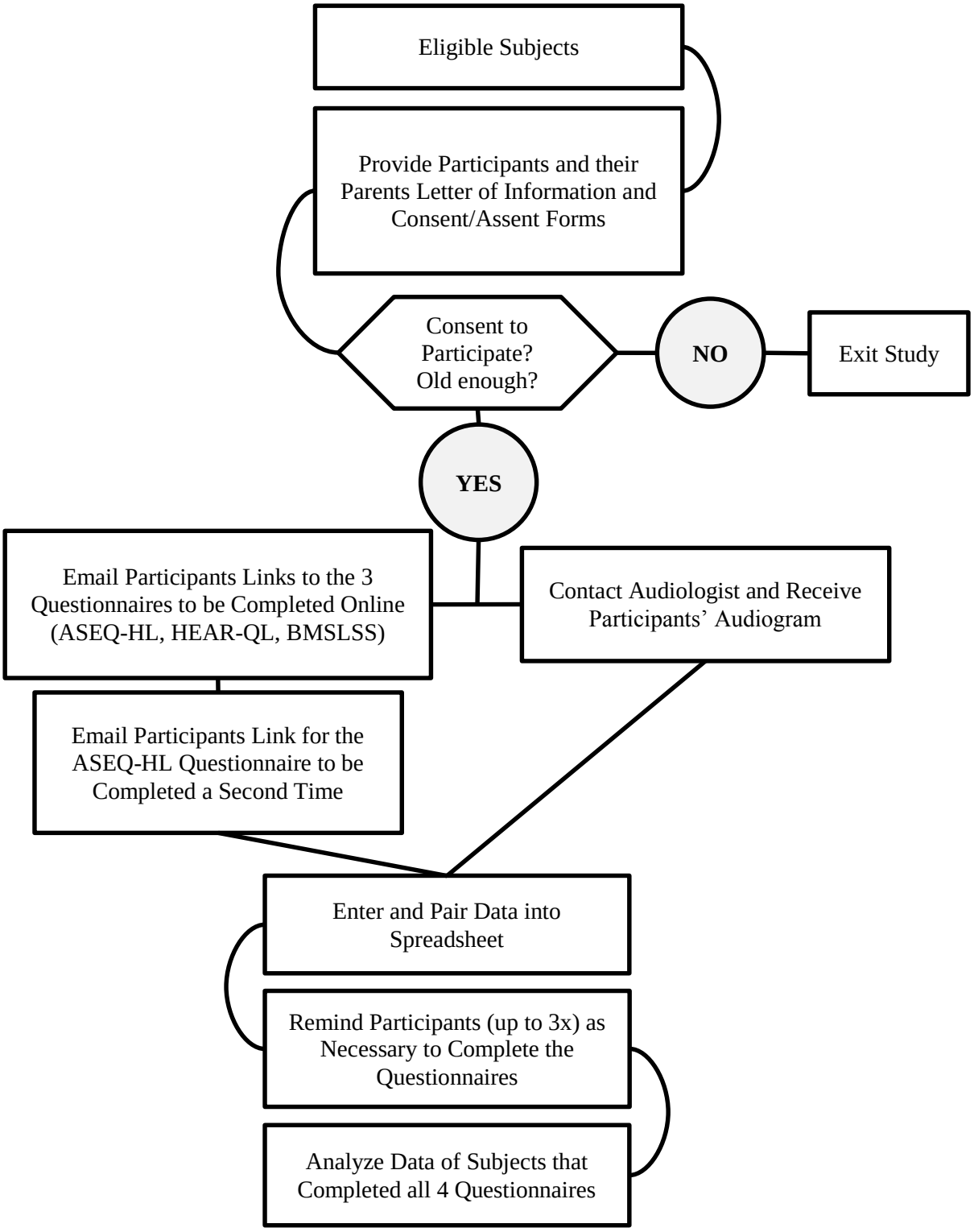

Figure 4-1. Flowchart of the Recruitment and Data Collection Process.

4.2.3 Questionnaires

Participants completed three questionnaires: the Adolescent Self-Efficacy Questionnaire for Hearing Loss (ASEQ-HL), the Hearing Environments And Reflection on Quality of Life (HEAR-QL; Umansky et al., 2012; Rachakonda et al., 2014) and the Brief Multidimensional Student's Life Satisfaction Scale (BMSLSS; Seligson et al., 2003). The latter two questionnaires were used to determine construct validity of the ASEQ-HL. Questionnaires were completed through the web-based application, SurveyMonkey® or paper copy, as necessary.

The ASEQ-HL is a 37-item questionnaire that explores the self-efficacy beliefs of adolescents on a variety of youth-related daily activities. It begins with two practice questions and contains five subscales: personal life, school-related, non-structured recreational, social and organized activities. Responses per item are scored on an 11 point scale, from 0 – 100%, with higher scores indicating higher perceived self-efficacy. A not applicable choice is provided.

The HEAR-QL has been shown to be a sensitive, reliable and valid measure of hearing-related quality of life for adolescents (Umansky et al., 2012; Rachakonda et al., 2014). The response choices for each item use a five-point scale ranging from 'never (4)' to 'almost always (0)'. Higher scores signify a better quality of life related to their hearing. Two versions of the HEAR-QL are available based on the age of the subject. The HEAR_QL 26 version is designed for children between 7 and 12 years-old, and contains 26 questions across three subscales: environments, activities and feelings. The HEAR-QL 28 version is designed for adolescents aged 13 to 18 years, and contains 28 questions across four subscales: hearing situations, social interactions, school difficulties and feelings (Umansky et al., 2012; Rachakonda et al., 2014).

The BMSLSS allows the measurement of perceived quality of life with respect to key, specific life domains. The six-item questionnaire assess the satisfaction of children aged 8 – 18 with their family life, friendships, school experiences, self, living environment and overall life. A seven-point scale is used: terrible, unhappy, mostly dissatisfied, mixed (about equally satisfied and dissatisfied), mostly satisfied, pleased, and delighted. Higher

scores indicate higher satisfaction (Seligson et al., 2003). The BMSLSS has been validated and shown to have good to excellent reliability (Seligson et al., 2003) and test-retest reliability (Funk et al., 2006). It also has been shown to be suitable for use with youth who have chronic health conditions including communication disorders (McDougall et al., 2013).

4.2.4 Statistical analysis

Descriptive analyses of the data included the calculation of means and standard deviations of the 35 ASEQ-HL item scores, excluding practice questions, at Time 1 and Time 2. ASEQ-HL response values at Time 1 and Time 2 were used for analysis if the participant responded with a score on the provided response scale. For each ASEQ-HL item, minimum and maximum responses, response rates, frequencies of items skipped and items identified by respondents as 'not applicable' were calculated. The response rates per ASEQ-HL item are the numbers of participants who responded at both Time 1 and Time 2 with a score from 0 – 100%, excluding 'skipped' and 'not applicable' responses.

The test-retest reliability of the total ASEQ-HL scale and of each of the five subscales was measured by using the intraclass correlation coefficients (ICC), using only subjects' scores that had complete test-retest data for the questionnaire item. The ICC theoretically ranges from 0 to 1, and an ICC ≥ 0.70 is an acceptable level of test-retest reliability (Special Advisory Committee of the Medical Outcomes Trust [SACMOT], 2002).

The construct validity of the ASEQ-HL was assessed by calculating Pearson's *r* correlation coefficients and the coefficient of determination, r^2, comparing the total scores of the ASEQ-HL to the total scores of the HEAR-QL and the BMSLSS.

The SPSS Statistics software for Windows, Version 23 (IBM, Armonk, NY) was used for statistical analysis. *P* values ≤ 0.05 were considered statistically significant.

4.3 Results and Discussions

4.3.1 Participants

A total of 35 adolescents provided consent / assent and a copy of their most recent audiogram to participate in the study. Thirteen participants were excluded from the study because they were recruited while being involved in another study that manipulated the noise reduction programs of their hearing aids, thus potentially altering the results of this study. Two participants who expressed interest in participating were ineligible because they were too young, (i.e., under the age of 10 years). Of the remaining twenty eligible subjects, nine participants did not complete all 4 questionnaires during the duration of data collection: 11 subjects successfully completed all 4 questionnaires and their data were analyzed. Demographic information for the participants is listed in Table 4-1.

Slightly more than half (55%) of the adolescents were female and the mean age was 13 ± 2.5 (range 10 to 17) years. All 11 adolescents reported wearing hearing aids bilaterally. Participants (n=5) reported wearing their hearing aids almost always. The average hearing loss as measured across frequencies (250 – 6000 Hz) was a bilateral, moderate sloping to moderately-severe hearing loss (See Figure 1).

Table 4-1. Demographic Characteristics of Subjects.

Total Sample n	11
Sex n (%)	
Male	4 (45)
Female	6 (55)
Mean age ± SD, (range) in years	13 ± 2.5 (10 – 17)
Hearing Instrument n (%)	
Bilateral Hearing Aids	11 (100)
Bilateral Cochlear Implants	0 (0)
*Mean Pure Tone Average (range) in dB HL**	
Left	59 (28 – 79)
Right	61 (38 – 80)
FM system usage n (%)	
Yes	3 (60)
No	2 (40)

SD, Standard Deviation.

* Mean 4 Frequency Pure Tone Average based on an average of thresholds at four frequencies (500, 1000, 2000 and 4000 Hz).

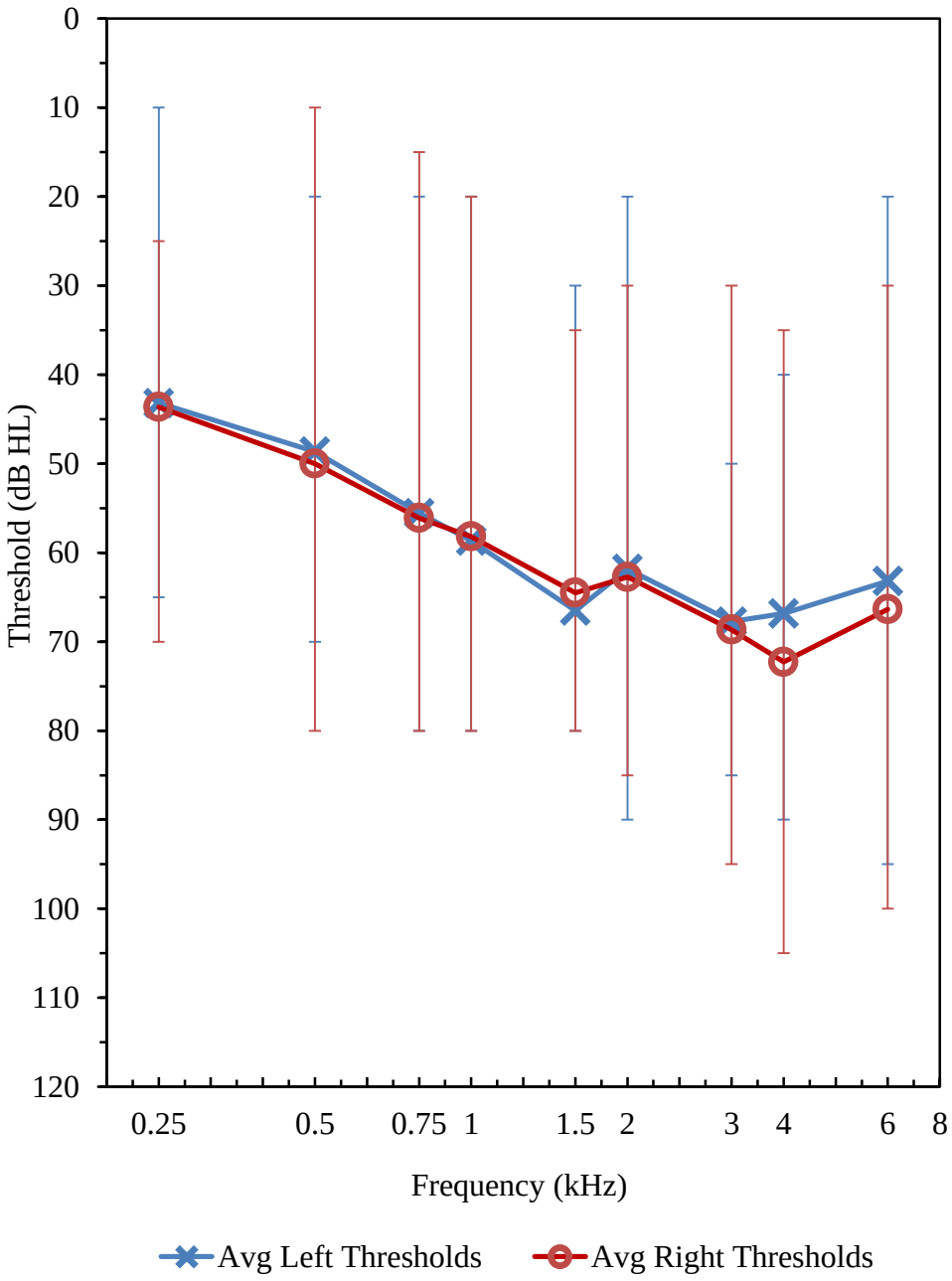

Figure 4-2. Average Thresholds for Participants, Including Minimum and Maximum Threshold Responses Per Frequency.

4.3.2 Descriptive Statistics

Means and standard deviations (SD) for Time 1 and Time 2 responses per ASEQ-HL question are displayed in Table 4-2. The mean and SD of the total combined scores of Time 1 and Time 2 as well as the minimum and maximum responses, response rates, and frequencies of skipped and not applicable responses per ASEQ-HL question are displayed in Table 4-2.

Five ASEQ-HL items were scored by less than 50% of the participants: ‘driving a vehicle (Q21)’, ‘using social networks like Facebook and Twitter (Q23)’, ‘doing a paid job (Q33)’, ‘doing volunteer work (Q34)’, ‘participating in youth groups / community organizations (Q35)’. Low response rates for these questionnaire items are likely associated with the young age of the participants; in other words, not many of the subjects scored these activities because they may be too young to participate in these activities.

Table 4-2. Mean and Standard Deviation (SD), Minimum and Maximum Responses, Response Rates, Frequencies of Skipped and Not Applicable Responses, Per ASEQ-HL Question for Time 1, Time 2, and Combined Average of Time 1 and Time 2 Responses.

Description of each ASEQ-HL question item / activity in order as they appear in the questionnaire	Time 1 Mean Self-Efficacy Score (SD)	Time 2 Mean self-efficacy score (SD)	Average Time 1 and Time 2 Mean (SD)	Minimum Response	Maximum Response	Response Rate	Frequency of Skipped Responses	Frequency of Not Applicable (NA) Responses
Helping Out Around The House	77.3 (14.9)	77.3 (16.8)	77.3 (13.3)	50	100	11	0	0
Shopping	66.4 (11.2)	59.1 (21.7)	62.7 (13.3)	20	100	11	0	0
Learning At School	68.0 (18.7)	77.0 (15.7)	72.5 (14.2)	40	100	10	0	1
Doing Homework	90.0 (12.5)	86.0 (16.5)	88.0 (10.9)	50	100	10	0	1
Reading Aloud In Class	77.8 (19.2)	71.1 (20.3)	74.4 (16.1)	40	100	9	0	2
Participating In School Clubs	64.4 (16.7)	80.0 (10.0)	72.2 (6.7)	40	100	9	0	2
Doing Hobbies	83.6 (16.3)	74.5 (21.6)	79.1 (15.1)	40	100	11	0	0
Watching TV / Movies	66.0 (23.7)	64.0 (25.9)	65.0 (21.3)	20	100	10	0	1
Waking Up On Your Own	51.3 (35.6)	55.0 (38.2)	53.1 (35.2)	0	100	8	0	3
Doing Individual Activities	66.7 (29.2)	71.1 (22.6)	68.9 (24.3)	10	100	9	1	1
Playing Video / Computer / Internet Games	91.3 (11.3)	87.5 (21.9)	89.4 (11.8)	40	100	8	0	3
Listening To Music	81.0 (19.1)	76.0 (25.0)	78.5 (19.2)	40	100	10	0	1
Playing A Musical Instrument	65.0 (30.7)	80.0 (14.1)	72.5 (12.2)	10	100	8	1	2

Singing Solo	65.0 (27.4)	85.0 (18.7)	75.0 (19.5)	30	100	6	1	4
Singing In A Group	65.7 (23.7)	60.0 (25.2)	62.9 (7.6)	20	100	7	2	2
Swimming With Friends	40.0 (37.0)	60.0 (27.8)	50.0 (27.1)	0	100	8	1	2
Riding A Bike	79.0 (16.6)	67.0 (35.3)	73.0 (20.0)	0	100	10	0	1
Using Public Transportation	66.0 (27.6)	65.0 (26.4)	65.5 (22.3)	10	100	10	0	1
Driving A Car	30.0	60.0	45.0	30	60	1	2	8
Travelling As A Passenger	86.0 (18.4)	79.0 (22.3)	82.5 (19.5)	40	100	10	1	0
Using Social Media	90.0 (10.0)	96.7 (5.8)	93.3 (5.8)	80	100	3	1	7
Texting / Instant Messaging	92.0 (13.0)	84.0 (25.1)	88.0 (12.5)	40	100	5	1	5
Writing Emails	96.0 (5.5)	96.0 (8.9)	96.0 (6.5)	80	100	5	1	5
Talking On The Phone	56.0 (23.7)	69.0 (20.2)	62.5 (20.8)	20	100	10	1	0
Going To A Party	67.8 (17.2)	74.4 (21.9)	71.1 (17.8)	30	100	9	2	0
Hanging Out With Friends	73.0 (20.6)	80.0 (16.3)	76.5 (18.1)	50	100	10	1	0
Hanging Out With Parents / Family	76.3 (16.0)	88.8 (11.3)	82.5 (10.4)	50	100	8	3	0
Visiting Other People's Homes	75.6 (14.2)	74.4 (21.3)	75.0 (17.0)	30	100	9	2	0
Playing Sports	70.0 (17.9)	66.7 (30.8)	68.3 (22.9)	10	100	6	2	3
Doing Religious Activities	81.4 (15.7)	81.4 (17.7)	81.4 (15.7)	50	100	7	2	2
Doing A Paid Job	80.0	70.0	75.0	70	80	1	3	7
Volunteering	86.7 (11.5)	76.7 (11.5)	81.7 (11.5)	70	100	3	3	5
Participating In Youth Groups /	65.0 (21.2)	60.0 (14.1)	62.5 (17.7)	50	80	2	3	6

Community Organizations								
Taking Lessons	75.0 (21.4)	76.3 (22.0)	75.6 (20.6)	30	100	8	2	1
Taking Care Of Yourself	88.9 (15.4)	81.1 (33.0)	85.0 (21.7)	10	100	9	2	0

4.3.3 Reviewing Inappropriate Responses

A response of zero (i.e., 0%) on the ASEQ-HL is a valid response choice indicating that the individual does not feel self-efficacious managing communication during participation in that activity. Participants also had the option of selecting 'not applicable' as a response if the activity within the questionnaire was not applicable to them. This could be because they do not regularly participate in that particular activity or that they were too young to participate in that activity (job, driving a car). The participants also had the option to skip a question while completing the questionnaire. This decreased response burden and ensured that the subjects completed the questionnaires voluntarily.

Some responses of zero (i.e., 0%) were suspected to not be true 0% responses, therefore a misuse of the response scale. To correct for 'suspicious zeroes', skipped, and 'not applicable' responses, zero responses were identified and compared to the participants' comments for that particular item to decide whether or not it was an appropriate use of the response scale. Also, responses at Time 1 and Time 2 were compared to identify if there were differences between their responses at the two different time points (e.g., did they respond with a 0 – 100% score in Time 1 and not in Time 2). Finally, participant age was also examined related to the 0 – 100% responses and comments to make sense of the response (e.g., was their response for a paid job truly 'not applicable' because they were too young).

Four cases of 'suspicious zeroes' were identified in subject L004 who was 12 years-old. This participant scored 'using social networks like Facebook and Twitter (Q23)', 'Texting / instant messaging (Q24)', 'Writing emails (Q25)' and 'Doing a paid job (Q33)' as '0%' in Time 1. In the comment section, the participant described Q23, Q24, Q25, as "n / a". For Q33, subject L004 commented "I don't have a job" and scored that questionnaire item as 'n / a' in Time 2. For 'doing volunteer work (Q34)', subject L004 skipped the question in Time 1 and commented "I don't volunteer" and scored the item as "n / a" in Time 2. Therefore, for all five of these responses, they were appropriately altered to 'n / a' instead of '0%' or 'skipped'.

One case of not understanding the question was identified in subject L018 aged 10 years. This participant skipped ‘taking care of yourself (Q37)’ in Time 1 and commented “I can if I need to. And I also don’t understand the question”. In Time 2, subject L018 scored 100% and commented ‘that makes no sense. I shower alone’. Therefore to avoid using this score in the calculation of the average of this item, the response in Time 2 was altered from ‘100%’ to ‘skipped’.

Finally, there were a few cases in which ‘not applicable’ was reported to activities in which adolescents typically and regularly participate: ‘learning at school’, ‘doing homework’, and ‘doing individual activities’.

4.3.4 Examining Qualitative Comments with Quantitative Scores to Facilitate Understanding of Factors Contributing to Self-Efficacy and Participation

An examination of the participants’ qualitative comments and quantitative scores of the ASEQ-HL revealed that the degree of difficulty perceived by the adolescents to manage their communication and / or their listening environment varied among the 37 questionnaire items / activities. This is consistent with Bandura’s guidelines that specify that self-efficacy questionnaires should include a range of difficulty (Bandura, 2006b). It also showed that for most activities adolescents with hearing loss experience a range of difficulties in managing communication. This means that the response scale for the questionnaire is appropriate since it captured the range of difficulty experienced. The intention is that the ASEQ-HL can be used as a measure of self-efficacy across situations in which adolescents participate. In order to assist with developing and defining potential intervention strategies for occasions where self-efficacy scores were low, we provided a comment section for each item with the prompt: “what makes it easy / difficult for you to participate in this activity?” This more qualitative-based information provided an opportunity to examine common themes / issues that teens encountered when trying to participate in activities. Table 4-3, lists the 11 ASEQ-HL items that received a mean self-efficacy score across subjects of less than 70%, representing a moderate self-efficacious perception for individuals during these activities. This was an arbitrary mean cut-off value that appeared to reflect a potentially true self-efficacious difference for this small

group of subjects. For the 11 items, two members of the research team (SZ and SM) examined the comments for consistent themes affecting self-efficacy and / or participation in the activity. A summary is provided below.

Table 4-3. List of 11 ASEQ-HL Items that Received a Mean Self-Efficacy (SE) Score Across Subjects of Less Than 70%, in Order of Most Difficult.

Description of each ASEQ-HL question item / activity	**Mean Self-Efficacy Score**	**Number of Responders (%)**	**Frequency of skipped responses (%)**	**Frequency of not applicable responses (%)**
Driving A Car	45.0	1 (9%)	2 (18%)	8 (73%)
Swimming With Friends	50.0	8 (73%)	1 (9%)	2 (18%)
Waking Up On Your Own	53.1	8 (73%)	0	3 (27%)
Talking On The Phone	62.5	10 (91%)	1 (9%)	0
Participating In Youth Groups / Community Organizations	62.5	2 (18%)	3 (27%)	6 (55%)
Shopping	62.7	11 (100%)	0	0
Singing In A Group	62.9	7 (64%)	2 (18%)	2 (18%)
Watching TV / Movies	65.0	10 (91%)	0	1 (9%)
Using Public Transportation	65.5	10 (91%)	0	1 (9%)
Playing Sports	68.3	6 (55%)	2 (18%)	3 (27%)
Doing Individual Activities	68.9	9 (82%)	1 (9%)	1 (9%)

The lowest average SE score across subjects was for ‘driving a car’, which received a mean score of 45%. However, only one (9%) adolescent scored this questionnaire item but did not comment on the ease or difficulty of communicating while driving a vehicle. Seventy three percent of subjects (n=8 respondents) scored this item as ‘not applicable’, and 18% (n=2) did not answer this item. This is likely because of their young age and not yet able to drive.

‘Swimming with friends’ appeared to be a common difficult activity for adolescents. The average SE score across the subjects providing a response was 50% (n=8 or 73% of respondents). The main difficulty experienced while swimming for individuals with hearing loss is the inability to wear their hearing aids while in a pool. Some adolescents commented that needing to wear swimming earmolds (swim molds) that fully occlude the ear, and the high levels of background noise around a pool, including music and other people talking, make it very difficult for them to hear. Some teens noted that their strategy to reduce communication difficulty in a pool setting was to lip read.

Another activity that was deemed communicative challenging for the adolescents was ‘waking up on your own’, with an average SE score across subjects of 53.1% (n=8 or 73%). Comments provided by this group of adolescents indicated that because they do not wear their hearing aids while sleeping, they often are unable to hear their alarm clock or parents calling to waken them. Their strategy in this situation is to rely on their parents to wake them.

The average SE score across subjects for ‘talking on the phone’ was 62.5%, (n=10 or 91%). The majority of the adolescents reported that communication on the phone was impacted by the sound level of the communication partner, poor sound quality / clarity and level of background noise. Increasing the volume on the phone handset and / or using the speaker option on the phone were strategies used to reduce the communication difficulty.

‘Participating in youth groups / community organizations’ also received an average score of 62.5% across participants (n=2 or 18%). The response rate for this item was low as six participants (55%) reported it was ‘not applicable’ to them and three (27%) skipped the

item. Based on the few comments provided, it appears that the environment(s) of community group-based organization activities may be reverberant and noisy, making it difficult for adolescents with hearing loss to participate. This leads to the question, did the six participants who reported it was not applicable to them and the three who skipped the question not participate in youth groups / community organizations because they were not interested or was it because they know they will not function well in this environment? One adolescent commented that they need an FM system to help them hear during youth group / community organization-based activities.

The average score across subjects for 'shopping' was 62.7% (n=11 or 91%). The main theme among the adolescents' comments was the challenge of communicating in the loud and noisy environments of a mall or shopping centre. They reported that the noise of other people talking, the loud music in stores and the reverberation (echo) in the mall and large warehouse-type stores made it difficult to hear and maintain conversations. They also commented that being in unfamiliar environments and communicating with people other than their family members and friends was difficult for them. They noted that they experience less difficulty managing their communication while shopping when they are in close proximity to whomever is speaking and when in calm and quiet environments like grocery stores.

'Singing in a group' was also challenging to the participants, especially when compared to 'singing solo'. The average SE score was 62.9% (n=7 or 64%), compared to the average score of 'singing solo' which was 75% (n=6 or 55%). The adolescents commented that they have difficulty hearing, especially in background noise. While there were more comments for 'singing in a group' relative to 'singing solo', the main difference between the two activities was that the adolescents noted they become nervous and complained that there was too much going on in group settings.

The average score across subjects for 'watching TV / Movies' was 65% (n=10 or 91%). The adolescents mostly commented on their difficulty in hearing words and music while watching TV or movies. Several of them reported the benefits of increasing the volume, connecting their compatible FM or Bluetooth system to the TV, and accessing captioning

while viewing TV. Some subjects noted that trying to converse with others while the TV was on was challenging because the sound level of the TV interfered with their ability to hear what their communication partner was saying.

The average SE score across subjects for communicating while ‘using public transportation’ was 65.5% (n=10 or 91%). When the bus ride was quiet and / or there were not a lot of passengers, adolescents reported little difficulty managing communication on a bus. However, for many adolescents managing communication while using public transportation was affected by loud speaking voices of multiple talkers and traffic noise.

The average SE score for managing communication while ‘playing sports’ was 68.3% (n=6 or 55%). The adolescents commented that they experience difficulty hearing when their name is called and when it is loud while playing sports. The comments for this activity were minimal.

The average self-efficacy score across subjects for managing communication while ‘doing individual activities’ was 68.9% (n=9 or 82%). Some of the adolescents reported difficulties in hearing their coaches or teammates and hearing in loud environments. Other comments were related to their hearing aid experience and the need to remove hearing aids because of sweating, and having the hearing aids feedback (make a whistling sound) when wearing helmets during some activities. One adolescent commented on her inability to wear headphones to listen to music while jogging because of safety concerns and the potential of her inability to hear oncoming traffic.

The qualitative comments provided by the adolescents facilitated our understanding of their SE scores. They provided specific information that could be used to define needs during intervention appointments and to develop goals and define strategies to improve SE and / or technological suggestions to improve communication.

4.3.5 Test-Retest Reliability

Table 4-4 summarizes the test-retest reliability for ASEQ-HL and its five activities subscales, for the 11 participants that completed the ASEQ-HL twice. The intraclass

correlation coefficients (ICC) were calculated using a two-way mixed absolute agreement model to assess test-retest reliability. The test-retest reliability for the total ASEQ-HL was 0.82 ($p<0.01$), personal life subscale was 0.96 ($p<0.05$), the school-related subscale was 0.55 ($p=0.29$), non-structured recreational subscale was 0.71 ($p<0.05$), social subscale was 0.88 ($p<0.01$), and organized subscale was 0.84 ($p<0.01$) between the first and second assessment of the ASEQ-HL.

Table 4-4. Test-Retest Reliability Results for Total ASEQ-HL and its Five Activities Subscales.

	Number of items	**Mean Test (SD)**	**Mean Retest (SD)**	**ICC (95% CI)**
Total ASEQ-HL	37	73.5 (14.3)	75.4 (10.9)	0.820 (0.652 – 0.907) **
Personal Life	4	70.9 (16.0)	68.1 (13.0)	0.961 (0.612 – 0.997) *
School-related	4	75.1 (11.4)	78.5 (6.2)	0.547 (-45.689 – 0.972)^{NS}
Non-Structured Recreational	13	68.1 (17.5)	71.5 (9.6)	0.712 (0.079 – 0.912) *
Social	8	78.3 (13.6)	82.9 (10.3)	0.878 (0.0.417 – 0.975) **
Organized	6	76.3 (8.0)	71.8 (7.8)	0.836 (-0.043 – 0.977) *

Significant at the *0.05 and ** 0.01 (two-tailed).

ASEQ-HL, Adolescent Self-Efficacy Questionnaire for Hearing Loss; ICC, Interclass correlation coefficient; NS, non-significant; SEM, Standard Error of Measurement; SD, Standard Deviation.

An instrument is considered reliable over the test-retest period if the between-person variance is much greater than the within-person variance over the two administrations (Deyo, Diehr, & Patrick, 1991). The full scale and most subscales exceeded the acceptable test-retest reliability coefficient (ICC $\geq$ 0.70; SACMOT, 2002), indicating that the ASEQ-HL appears to be a reliable measure. The school subscale, made up of four items (learning at school, doing homework, reading aloud in class, and participating in school clubs), however, yielded only a moderate test-retest reliability. A possible explanation of this result is that many subjects responded differently at test and retest for the school subscale, thus likely increasing the within-person variance more than the between-person variance. A further analysis of the subjects' individual scores and comments on the school subscale displayed discrepancies between responses at both

assessment times and for qualitative and quantitative responses. For example, one respondent reported the same comment regarding the difficulty faced while doing homework at both time points, however rated self-efficacy drastically different (60% in Time 1 and 90% in Time 2). Another respondent commented on the ease of learning at school in Time 1 (score of 90%), and commented on the difficulty of learning at school in Time 2 (score of 40%). The varying responses in these subjects for school-related activities may in part be due to school being a dynamic and demanding environment. Students also spend most of their days at school and experience a lot of frustrations, especially if they also have hearing loss. Therefore, they may be more sensitive and more likely to report on changes and difficulties experienced with school-related activities, as well as at different times of the school year and in the context of deadlines. Therefore, to evaluate that nothing else has changed except for time, which test-retest assumes, respondents may be asked at retest whether there have experienced any changes in their daily activities since the first questionnaire (Elkin, 2012). Finally, perhaps the ASEQ-HL has too few school-related items, which may not reflect all the activities that adolescents participate in at school. Working towards expanding the current list of four school-related activities may help to increase the test-retest reliability of the school-related subscale as well as the full scale.

4.3.6 Construct Validity

For this pilot study (n=11 subjects) the construct validity of the ASEQ-HL was investigated by comparing its total scores to the total scores of the BMSLSS and HEAR-QL. The mean ASEQ-HL responses of the 11 subjects with mean age 13 ± 2.5 years were compared to the mean BMSLSS responses. Table 4-5 displays the Pearson's *r* correlation and the coefficient of determination r^2 of the total ASEQ-HL scores as compared to the total BMSLSS [r = -0.082; $F(1, 9) = 0.062$, p=0.81, $r^2 = 0.007$], indicating non-significance. Six subjects with mean age 11 ± 1.1 years completed the child-version HEAR-QL 26, while five subjects with mean age 15 ± 1.6 years completed the adolescent-version HEAR-QL 28. The combined responses of the HEAR-QL of the 11 subjects were compared to their total ASEQ-HL responses. Table 4-5 displays the Pearson's *r* correlation and the coefficient of determination r^2 of the total ASEQ-HL

scores as compared to the total HEAR-QL [r = -0.223; $F(1, 9) = 0.472$, p=0.51, r^2 = 0.05], indicating non-significance.

Table 4-5. Pearson's Correlation Coefficient between the ASEQ-HL and to Other Validated Questionnaires (HEAR-QL and BMSLSS).

	n	***r***	**r^2**
Total Scores			
ASEQ-HL X BMSLSS	11	-0.082 ^{NS}	0.007 $F(1, 9) = 0.062$, p=0.81
ASEQ-HL X HEAR-QL	11	-0.223 ^{NS}	0.050 $F(1, 9) = 0.472$, p=0.51

Significant at the *0.05 and ** 0.01 (two-tailed).

ASEQ-HL, Adolescent Self-Efficacy Questionnaire for Hearing Loss; BMSLSS, Brief Multidimensional Student Life Satisfaction Scale; HEAR-QL, Hearing Environments And Reflection on Quality of Life; NS, non-significant; *r*, Pearson's correlation coefficient; r^2, coefficient of determination.

An instrument is considered to have construct validity if it is measuring what it intends to measure, which may be assessed by examining the relationship between related scales (Elkin, 2012). The ASEQ-HL was found to be more correlated to the quality of life measure (HEAR-QL) than it was to the life satisfaction measure (BMSLSS). There could be several explanations for this result. First, this pilot study had a small sample size of 11 subjects. A closer visual inspection of the data revealed that two subjects had more variability in their Time 1 and Time 2 responses relative to the other nine respondents. It is unknown whether these two outliers impacted the results shown here. Second, the HEAR-QL looks at the quality of life for adolescents with hearing loss, but is not necessarily as strongly weighted in activities as is the ASEQ-HL. Therefore, for future consideration an activity-related questionnaire, such as the Children's Assessment of Participation and Enjoyment (CAPE) (King et al., 2004), should be considered in a validation study. Finally, the three measures may in fact be measuring three different constructs therefore resulting in non-significant correlations. Similarly, the subscales within the ASEQ-HL and the HEAR-QL seemed to be similar and have similar titles, such as the social and school subscales, however on closer examination of the items within each subscale they did not necessarily measure the same type of activities and situations within each questionnaire. Does this mean that we should not include the

HEAR-QL or BMSLSS in our larger study? The answer is no, they should be included because recent literature finds that quality of life is related to the self-efficacy of adolescents with chronic conditions (Cramm et al., 2013) and to the ICF components and satisfaction with participation (Yeung & Towers, 2014). Therefore, quality of life and satisfaction measures such as the HEAR-QL and BMSLSS can be used to validate measures related to self-efficacy and ICF components, such as the ASEQ-HL. To use the HEAR-QL in future validity work, its items may be reorganized and grouped in accordance to the ASEQ-HL subscales, rather than its existing subscales definitions.

4.4 Limitations and Future Work

First and foremost, the small sample size of this pilot study was a limitation that may account for the non-significance of some results. Future work will require a larger sample size to further evaluate the psychometric properties of the ASEQ-HL. Additional analysis of the ASEQ-HL may include measures of internal consistency (e.g., calculations of Cronbach's alpha (α) coefficient), discriminate ability (e.g., differences in varying degrees of hearing loss, age and gender), and analysis at the level of the subscales (e.g., correlations between the ASEQ-HL and HEAR-QL subscales). This analysis was not conducted for the pilot study because of the small sample size and missing scores across subjects. The construct validity of the ASEQ-HL may also be evaluated with the addition of an activities-related questionnaire, such as the CAPE (King et al., 2004).

Second, school and formal education are important and time-consuming adolescent-related activities (Adolfsson, 2013), and adolescents can spend approximately 7 hours per weekday at school (Zill, Nord, & Loomis, 1995; Hofferth & Sanberg, 2001; Copperman & Bhat, 2007). However, the school-related activities subscale of the ASEQ-HL contains only four items, which may be too few items to accurately capture and reflect the demands and activities that adolescents participate in at school. Working towards expanding the current list of four school-related activities may help to increase the reliability of the school-related subscale as well as the full scale.

~~Second~~Third, the subjects in this study were sent and asked to complete all three measures at the same time. This task required the subjects to have self-motivation,

independence, and diligence when completing the questionnaires. To avoid lack of interest, misuse of the response scale, and skipping questions, and to maintain reliability and integrity of the answers, future administration of the ASEQ-HL may be in the form of an interview with the researcher.

~~Third~~Finally, the use of self-report measures may also be a limitation of this study. Future work may include using the measure in conjunction with additional sources of data. This may include multi-methods or multi-informants to supplement the self-reports obtained from the adolescent participants.

4.5 Conclusion

This pilot project found that the ASEQ-HL shows promise as a tool that can provide an assessment of SE for this population. Initial analysis shows some that the ASEQ-HL may be a reliable measure. The construct validity of the ASEQ-HL was not achieved because the correlation of the ASEQ-HL to two quality of life questionnaires were non-significant. Future work with a larger sample size, further statistical analyses and potentially an activities-related questionnaire should be considered to focus on ensuring the psychometric properties of the ASEQ-HL.

Chapter 5

5 CONCLUSION

5.1 Introduction

Participation is the involvement of an individual in a life event, and is an important concept for all adolescents and their development (WHO, 2007). Youth participation allows young people to develop physical, cognitive, and social skills (Chien, Rodger, Copley, & Skorka, 2014). It allows adolescents to exercise their rights as citizens and contribute positively to society (Checkoway, 2011). It also empowers them to make decisions and influence their own lives (Checkoway, 2011). Thus promoting participation in everyday life activities among adolescents is a significant goal (Chien et al., 2014). It is especially important for individuals with disabilities who access rehabilitation and health care services, because of the greater potential of limitations associated with their impairment.

The International Classification of Functioning, Disability and Health (ICF-CY; WHO, 2007) provides a common and universal language to describe how children and youth function in everyday life situations. The ICF-CY (WHO, 2007) framework allows researchers, parents and healthcare service providers to describe a child with a disability, such as a hearing loss, not only from the point of view of their impairment; rather, it offers the perspective of the child amid the relevant contextual factors and the potential activity limitations and participation restrictions.

Self-efficacy can be used as a mediating factor in the rehabilitation process of individuals with disabilities (Smith & West, 2006: Jennings et al., 2014). Self-efficacy refers to the belief in one's capabilities to successfully perform a desired activity or task (Bandura, 1997). Adolescents with high perceived self-efficacy display high levels of engagement, effort and positive social behaviours (Zimmerman & Cleary, 2006). They are also more perseverant, motivated and academically ambitious, relative to their peers with low self-efficacy (Zimmerman & Cleary, 2006). Thus, measuring the self-efficacy of children and adolescents with disabilities across various everyday life activities will help identify and

understand restrictions in youth participation. It will also help to facilitate and guide meaningful intervention to promote participation in the daily lives of adolescents with disabilities, such as hearing loss.

To date there is no measure that can be used to assess the self-efficacy for adolescents with hearing loss relative to their participation in everyday life situations. Therefore, the objective of this research has been threefold. First, we aimed to establish a comprehensive inventory of daily life activities that were meaningful and relevant to adolescents, regardless of their health status and abilities. Next, we strived to develop a questionnaire that probes the perceived self-efficacy of adolescents with hearing loss to manage their communication and or listening environments across these everyday life activities. Finally, we conducted a small pilot study of this questionnaire with a group of 11 adolescents with hearing loss to assess validity, reliability, and identify design and methodological issues so that they could be resolved prior to undertaking a large-scale study.

5.2 Summary of Findings and Conclusions

The comprehensive inventory of adolescent-focused daily life activities was based on a literature review of how adolescents spend their time. It resulted in a list of 21 activities over five broad categories of activities, including personal life, school-related, non-structured recreational, social and organized. These activity items were linked to and described from the perspective of the ICF-CY conceptual framework (WHO, 2007).

The items were simplified, reworded and accompanied by explanatory descriptions, guided by initial feedback of researchers and adolescents as well as the CAPE manual (King et al., 2004), to ensure ease of comprehension and a new focus on adolescents with hearing loss. The resultant list of 35 adolescent-relevant activities and the addition of two problem questions constituted the basis of the 37 questionnaire items of the Adolescent Self-Efficacy Questionnaire for Hearing Loss (ASEQ-HL). The wording of the statements in the ASEQ-HL that assessed the perceived self-efficacy of adolescents with hearing loss to manage their communication and or listening environments across

various everyday life activities were constructed using perceived self-efficacy guidelines proposed by Bandura (2006b).

A small population of adolescents with hearing loss were recruited to assess the validity and reliability of the ASEQ-HL. Eleven adolescent participants completed the study which involved the completion of four questionnaires online. Test-retest reliability was assessed based on the administration of the ASEQ-HL at two time points. The construct validity of the ASEQ-HL was measured in comparison to the Hearing Environments And Reflection on Quality of Life (HEAR-QL; Umansky et al., 2012; Rachakonda et al., 2014) and the Brief Multidimensional Student's Life Satisfaction Scale (BMSLSS; Seligson et al., 2003). This small pilot project found that the ASEQ-HL shows promise to be a reliable measure. Also, the construct validity of the ASEQ-HL was not achieved because the correlation of the ASEQ-HL to two quality of life questionnaires were non-significant. Future work with a larger sample size, further statistical analyses and potentially an activities-related questionnaire should be considered to focus on ensuring the psychometric properties of the ASEQ-HL.

5.3 Contribution to Knowledge and Future Directions

The ASEQ-HL contributes to the literature that assesses self-efficacy in individuals with hearing loss by providing a measure that probes these perceptions in adolescents. This type of instrument is not currently available and its use will facilitate a more individualized and holistic approach to defining habilitation / rehabilitation goals. Similar to the existing four adult self-efficacy questionnaires, an adolescent-focused measure will help to identify potential barriers that restrict participation for youth. It will also assist adolescents, caregivers and health-care providers to identify appropriate interventions to positively impact audiologic outcomes. It will also provide a common language for interdisciplinary collaboration and communication. A secondary, and significant contribution of this work is the development of a list of adolescent-related activities that can be used to facilitate the development of additional self-efficacy-based questionnaires for adolescents with other disabilities, such as vision loss.

Future work with the ASEQ-HL will involve a larger scale validation study of the questionnaire. This research will include exploratory factor analyses to determine underlying factor structure and to see if items need to be retained or removed. Questionnaire items with low response rates may become optional items, for which the adolescent can comment on at their own discretion. Furthermore, the use of the ASEQ-HL as a measure that is sensitive to intervention changes, or a pre- and post-treatment measure, may also be considered. Additionally, whether the ASEQ-HL will remain only an online questionnaire may be studied. Alternatively, the ASEQ-HL can be administered in an interview style during clinic visits in which the adolescent completes the questionnaire with the audiologist. This method of administration will also allow the audiologist to work with the adolescent to define an importance weighting on problematic questionnaire items. This will facilitate a more individualized approach to intervention by allowing adolescents to rank the activities in order of importance to them so that more focus is placed on the activities for which they want to improve their participation. Finally, completing the questionnaire with the adolescents will provide audiologists the opportunity to critically assess a low score on a particular questionnaire item. The clinician will be able to inquire whether a low score was truly an indication of low self-efficacy, self-selecting not to participate because of their hearing loss, or low interest in a particular activity.

5.4 Limitations

Some challenges were faced related to the review of how and in what activities adolescents spend their time (Chapter 2). For example, the terminology for activities differed among the articles reviewed, as did the age range considered as adolescents, and how the articles measured time spent.

Participants were provided with the option to ‘skip’ items when completing the ASEQ-HL to reduce respondent burden and maintain the voluntary nature of the process. Skipping questionnaire items, rather than providing a self-efficacy score or a ‘not applicable’ response, resulted in data that were difficult to interpret. Future work can consider encouraging the adolescents to respond to all items. An explanation of what ‘not-applicable’ means should be included on each page. Interview-style administration,

as discussed previously, may allow the audiologist to attend more to the items the adolescent would have skipped, and to support the adolescent while completing the questionnaire.

Finally, while the small population of participants provided an initial analysis of the data that may guide future directions, it was a limitation of this study. A larger study sample should be recruited to assess the psychometric properties of the ASEQ-HL and guide any changes in its content or method of delivery.

5.5 Concluding Statements

The Adolescent Self-Efficacy Questionnaire for Hearing Loss is a 37-item questionnaire intended for adolescents with hearing loss. Its use in clinical settings will equip audiologists, caregivers and the adolescents with a tool to quantify participation in the daily activities of adolescents with hearing loss. Its application will also individualize treatment interventions and guide setting goals for these adolescents. Future work to assess the psychometric properties of the ASEQ-HL on a larger scale and the applicability of the inventory of adolescent-related activities to those with other disabilities will help to further develop and promote the use of the questionnaire.

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Appendices

Appendix 1. ASEQ-HL Items and Descriptions (Copyright 2015).

Item[a]	Expanded Item Description
1. Taking care of yourself	includes personal care and hygiene
2. Waking up on our own	
3. Helping out around the house	includes doing chores and house work on a regular basis, such as taking out the garbage, cutting the grass, making meals and / or folding laundry
4. Shopping	includes shopping on-line or in store for groceries, clothing or other items
5. Learning at school	includes all school work and activities involved in gaining education during school hours, such as reading, writing, and presenting
6. Doing homework	includes work required for school but completed outside of school hours
7. Reading aloud in class	
8. Participating in school clubs	includes extra-curricular clubs such as chess, science, book, yearbook, social, and / or athletic
9. Doing hobbies	including puzzles, playing board / card games, crafts, drawing, colouring, collecting things, etc
10. Watching TV or movies	
11. Doing individual physical activities	includes jogging, working out, yoga, and rock climbing, skipping rope, swimming, gymnastics, casually playing with a ball on one's own.
12. Playing video / computer / internet games	
13. Listening to music	
14. Playing a musical instrument	
15. Singing on your own ("solo")	
16. Singing in a group	
17. Swimming with friends at a beach or pool party	
18. Riding a bike	
19. Using public transportation	includes a city or school bus, or subway

20. Driving a vehicle	Includes travelling in a car or any other motor vehicle (motorcycle); and includes being a front-seat or back-seat passenger
21. Travelling as a passenger in a vehicle	Includes travelling in a car or any other motor vehicle (motorcycle); and includes being a front-seat or back-seat passenger
22. Using social networks like Facebook and Twitter	
23. "Texting" / "Instant messaging"	
24. Writing emails	
25. Talking on the phone	includes talking to others on a home phone, cell or pay-phone
26. Going to a party	includes birthday parties, reunions, weddings, graduations, and other celebrations
27. Hanging out with friends	includes spending time with friends with no specific activity planned
28. Hanging out with parents and family	includes spending time with parents or other family members with no specific activity planned
29. Visiting other people	includes going to someone's house for a meal or sleepover
30. Playing sports	includes team and non-team sports
31. Doing a religious activity	includes praying, mediating, attending a place of worship and / or religious class outside of the school curriculum
32. Doing a paid job	includes work at restaurants, stores, or community centres that is done for hire or profit
33. Doing volunteer work	includes activities volunteered for without pay
34. Participating in youth groups / community organizations	includes Scouts or Girl Guides
35. Taking lessons	includes lessons with an instructor, such as in music, singing, dancing, swimming, martial arts, language, educational, tutoring, etc

[a]Stem: How certain are you right now that you can manage communication and / or the listening environment when …

i. Response Scale

Cannot do at all	10%	20%	30%	40%	Sometimes can do	60%	70%	80%	90%	Always can do
○	○	○	○	○	○	○	○	○	○	○

ii. Comment Section

What is **easy** or **difficult** about managing communication during this activity?

iii. Overarching Question

How certain are you right now that you can manage communication and / or the listening environment when "ACTIVITY".

iv. Demographic Information

1. Please enter the initials of your first and last name (for ex. SM for Sheila Moodie)

2. Please enter your date of birth

3. Please enter your audiologist's name

v. Instructions

Please read carefully.

When communicating in different activities, you may have to change the way you hear or talk in order to communicate well. You may have to move closer to hear better in loud situations or you may need to wear an FM system in school.

This way of managing communication, means that you do more than just try to 'hear', you take extra steps to understand what is going on.

This questionnaire will list a number of different activities.

We would like you to use the scale provided to *rate how certain you are right now that you can manage communication and / or the listening environment in each activity.*

We would like you to use the scale provided to rate how certain you are right now that you can manage communication and / or the listening environment in each activity.

If you do not regularly participate in this activity, then make your best guess about how well you would manage.

If you believe that you cannot manage communication and / or the listening environment at all, then click on the 0% button "Cannot do at all" on the rating scale.

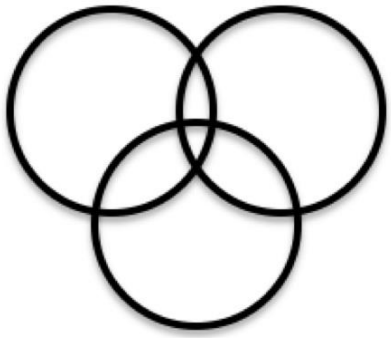
If you are absolutely certain that you can manage communication and / or the listening environment, then click on the 100% button "Always can do" on the rating scale.

If you believe that you are certain I can sometimes manage communication and / or the listening environment, then click on a button between 0% and 100% that matches how certain you are. Higher numbers indicate believing you are more certain.

vi. Practice Questions

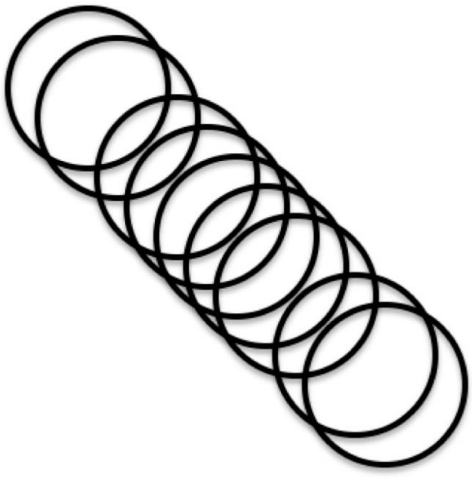
1. How certain are you right now that you can count the number of circles in the picture.

Cannot do at all	10%	20%	30%	40%	Sometimes can do	60%	70%	80%	90%	Always can do
○	○	○	○	○	○	○	○	○	○	○



2. How certain are you right now that you can count the number of circles in the picture.

Cannot do at all	10%	20%	30%	40%	Sometimes can do	60%	70%	80%	90%	Always can do
○	○	○	○	○	○	○	○	○	○	○



Curriculum Vitae

Sahar Zimmo MClSc

National Centre for Audiology || Western University

EDUCATION

Sep. 2013 – Present — **Master of Science in Health and Rehabilitation (MSc)**
Hearing Science
Western University, London, Ontario, Canada

Sep. 2011 – Jun. 2013 — **Master of Clinical Science (MClSc)**
Communication Sciences and Disorders - Audiology
Western University, London, Ontario, Canada

Sep. 2006 – Jun. 2011 — **Bachelor of Science (BSc)**
Honors Specialization in Biology
Western University, London, Ontario, Canada

Sep. 2006 – Jun. 2010 — **Bachelor of Management and Organizational Studies (BMOS)**
Honors Double Major in BMOS and Physiology
Western University, London, Ontario, Canada

POSITIONS

Oct. 2014 – Present — **Research Audiologist**
Child Amplification Lab
National Centre for Audiology
Western University, London, Canada
Supervisor: Susan Scollie

Sep. 2013 – Present — **Graduate Research Assistant**
Family-Centred Aural Habilitation Lab
National Centre for Audiology
Western University, London, Canada
Supervisor: Sheila Moodie

Sep. 2013 – Jun.e 2014 — **Educational Audiologist**
Speech-Language Pathologist and Audiology Services
Thames Valley District School Board
London, Canada

TEACHING EXPERIENCE

Sep. 2014 – Present **Graduate Teaching Assistant**
CSD 9511y: Applications in Audiometry
Faculty of Communication Sciences and Disorders
Western University, London, Canada

Sep. 2013 – Jun. 2014 **Graduate Teaching Assistant**
CSD 9511y: Applications in Audiometry
Faculty of Communication Sciences and Disorders
Western University, London, Canada

PUBLICATIONS

1) **Zimmo S**, Jennings MBJ, Moodie, S. The Adolescent Self-Efficacy Questionnaire for Individuals with Hearing Loss (ASEQ-HL): Development of Activities List. (2015). *Journal of the American Academy of Audiology.* In progress.

2) Keene K, Merovitz A, Irvine E, Manji N, Everett M, Chung I, Moodie S, Scollie S, Gamble A, **Zimmo S**, Morrison C, Chan B. (2013). Accuracy of Smartphone Sound Level Meter Applications. *Canadian Hearing Report*, 8(6), 24-28.

3) **Zimmo S**, Blanco J, Nebel S. (2012). The Use of Stable Isotopes in the Study of Animal Migration. *Nature Education Knowledge*, *3*(12):3.

POSTERS & PRESENTATIONS

1) **Zimmo S**, Jennings MB, Scollie S, Moodie S. Developing the Adolescent Self-Efficacy Questionnaire _ Hearing Loss (ASEQ-HL). *2015 Child Health Symposium - Connecting with Youth: Research and Best Practices in Child Health*. Western University, London, Ontario, May 22, 2015. (Presentation)

2) **Zimmo S**. Developing the Adolescent Self-Efficacy Questionnaire for Hearing Loss (ASEQ-HL). *Warren Estabrooks Speaker Series of SoundIntuition – "Monitoring the Development of Children who are Deaf or Hard of Hearing: Tools and Outcomes".* April 24, 2015. (Poster)

3) **Zimmo S**. The Development of the Adolescent Self-Efficacy Questionnaire for Hearing Loss. *Faculty of Health Sciences 3-Minute Thesis Competition – top 20 Finalist*. Western University, London, Ontario, April 9, 2015. (Presentation)

4) **Zimmo S**. The Development of the Adolescent Self-Efficacy Questionnaire for Hearing Loss. *Faculty of Health Sciences 3-Minute Thesis Competition –*

Preliminary Heat. Western University, London, Ontario, March 25, 2015. (Presentation)

5) **Zimmo S**, Jennings MB, Scollie S, Malandrino A, Levy C, Hawkins M, Bagatto M, Moodie S. Adolescent Self-Efficacy Questionnaire for Hearing Loss (ASEQ-HL). *Faculty of Health Sciences Research Day 2015*. Western University, London, Ontario, March 25, 2015. (Poster)

6) **Zimmo S**, Jennings, MB, Moodie, S. Development of a Self-Efficacy Questionnaire for Adolescents with Hearing Loss. *First Annual Child Health Symposium – "Collectively Creating Connections and Collaborations: Research and Best Practices in Child Health".* Thames Valley Children's Centre, London, Ontario, May 22, 2014. (Presentation)

CONFERENCES ATTENDED

1) *First Annual Child Health Symposium – "Collectively Creating Connections and Collaborations: Research and Best Practices in Child Health".* Thames Valley Children's Centre, London, Ontario, May 22, 2014.

2) *Warren Estabrooks Speaker Series of SoundIntuition – "Monitoring the Development of Children who are Deaf or Hard of Hearing: Tools and Outcomes".* Toronto, Ontario, April 24, 2015.

INVITED TALKS

1) **Zimmo, S**. WHO's International Classification of Functioning, Disability and Health. CSD 9520, School of Communication Sciences and Disorders, London Ontario, September 29, 2014. (Lecture)

OTHER SCHOLARLY ACTIVITIES

1) **Child Amplification Laboratory**. (2014). Protocol for the Provision of Amplification version 2014.01. M. Bagatto & S. Scollie, eds. Contributors: S.T. Moodie, R. Seewald, M. Hyde, S. Weber, V. Martin, D. Glista, A.M. Tharpe, J. Crukley, M. Hawkins, C. Levy, S. Zimmo, S. Easwar, V., Moodie, F. Richert, V. Parsa. Report developed for: Ministry of Children and Youth Services. November 17, 2014.

HONOURS & AWARDS

2015 **Health & Rehabilitation Sciences Program (HRS) Conference Travel Award**

	Awarded up to $300 funding to attend and present at an academic conference related to area of study
2015	**Faculty of Health Sciences (FHS) Graduate Student Conference Travel Award** *Awarded up to $400 funding to attend and present at a an academic conference related to area of study*
2014 – 2015	**Western Graduate Research Scholarship (WGRS)** *Awarded to a full time graduate student who is nominated by their graduate program*
2013 – 2014	**Western Graduate Research Scholarship (WGRS)** *Awarded to a full time graduate student who is nominated by their graduate program*
2010 – 2011	**Dean's Honour List** *Awarded to a full time student who has maintained an average of 80% or more*
2009 – 2010	**Dean's Honour List** *Awarded to a full time student who has maintained an average of 80% or more*
2009	**Ontario Volunteer Service Award** *Award in recognition of commitment to volunteerism from the Ontario Minister of Citizenship and Immigration*
2006	**Western Scholarship of Excellence** *Awarded upon admission to Western students who have an admission average of 90 – 94.9%*

RELEVANT GRADUATE COURSES

Winter 2015	HS 9641b: Bio-Psycho-Social Dimensions of Aging
Fall 2014 – Winter 2015	HS 9670y: Research Topics in Hearing Science
Fall 2014	HS 9601a: Quantitative Research Methods in Health Sciences
Fall 2013 – Winter 2014	HS 9670y: Research Topics in Hearing Science
Fall 2013 – Winter 2014	HRS Common Seminar
Fall 2011 – Winter 2012	CSD 9511y: Applications in Audiometry

LEADERSHIP & VOLUNTEER ACTIVITIES

Jun. 2014 – Present	**Board Director** *London Muslim Mosque* London, Ontario, Canada
Sep. 2003 – Present	**Unit Leader** *Girl Guides of Canada* London, Ontario, Canada
Sep. 2012 – Jun. 2013	**Communications Commissioner** *Student Council* Faculty of Communication Sciences and Disorders
Sep. 2012 – Jun. 2013	**Student Representative** *Graduate Program Committee* Faculty of Communication Sciences and Disorders