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Understanding the Subjective Norms Surrounding Noise Exposure and Hearing Conservation in Children

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Graduate Program in Health and Rehabilitation Sciences

A thesis submitted in partial fulfillment of the requirements for the degree in Master of Science

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Understanding the Subjective Norms Surrounding Noise Exposure
and Hearing Conservation in Children

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by

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Graduate Program in Health and Rehabilitation Sciences

A thesis submitted in partial fulfillment
of the requirements for the degree of
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THE UNIVERSITY OF WESTERN ONTARIO
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**Understanding the Subjective Norms Surrounding Noise Exposure
and Hearing Conservation in Children**

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Abstract

Hearing conservation programs (HCPs) often take an atheoretical, information-based approach to reducing noise-induced hearing loss. This research assesses HCPs through a Theory of Planned Behavior lens, with the goal of understanding subjective norms in children surrounding sound exposure and hearing conservation. Twelve participants engaged in one individual, structured interview. Data analysis consisted of three concurrent activities: data reduction, data display, and conclusion drawing/verification. This research ensured trustworthiness through the criterion of neutrality, which was achieved through the incorporation of both truth value and consistency. Four major themes emerged from the analysis of interview data: (1) knowledge regarding sound exposure and hearing conservation; (2) stigmatization surrounding the use of hearing protection devices in social settings; (3) emotional responses relating to sound; and (4) situational control influencing behaviour change. The perceived subjective norms surrounding sound exposure and hearing conservation reported by participants reflect an environment inimical to healthy hearing behaviours.

Keywords

Hearing conservation, Theory of Planned Behavior, subjective norms

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Chapter 1

1 Introduction

Although there is no consensus as to the prevalence of hearing loss among Canadians, it is undoubtedly a pervasive and debilitating health condition (Scarinci, Worrall, & Hickson, 2008), often cited as one of the most common chronic health conditions among older adults (Adera, Donahue, Malit, & Gaydos, 1993; Griest, Folmer, & Martin, 2007; Martin, Sobel, Griest, Howarth, & Shi, 2006; Thorne et al., 2008; Yueh, Shapiro, MacLean, & Shekelle, 2003). Any form of hearing loss can considerably affect one's functional ability, and consequently health status and quality of life (Mulrow, Aguilar, & Endicott, 1990). In reviewing the literature pertaining to negative consequences of uncorrected hearing loss, Arlinger (2003) noted that not only is hearing loss related to increased levels of depression and dementia, but it can also negatively affect physical, cognitive, behavioural, and social functions. For instance, hearing loss has been referred to as an invisible disability; one which individuals tend to conceal, reject, or deny (Hallberg & Jansson, 1996). This lack of acknowledgement of the experience of hearing loss results in an inability to fully understand auditory information, which may in turn lead to communication difficulties. For example, during interviews with women with hearing loss, Hallberg and Jansson (1996) found that many women employ avoidance-based strategies for dealing with these communication difficulties, such as pretending to hear and guessing what was said. This can cause severe frustration, resulting in an increased prevalence of mental stress. Consequently, individuals may choose, either consciously or subconsciously, to avoid this frustration completely by withdrawing from those social activities which require communication, such as group discussions and meetings (Hallberg and Jansson, 1996). Such behaviour results in increased social isolation, consequently decreasing quality of life among these individuals (Fellinger, Holzinger, Beitel, Laucht, & Goldberg, 2009).

These negative implications associated with hearing loss affect more than just the individual with hearing impairment. Social interactions among significant others, such as partners, family members, and friends, are also negatively impacted (Hallberg & Jansson,

1996). For example, Jones, Kyle, and Wood (1987) found hearing loss to affect interpersonal relationships within a family setting, resulting in behaviour changes such as a decrease in both intimate talk and joking. Such limitations are common among individuals with hearing loss. In a blog post by one advocate with hearing loss, the writer comments, “I do admit being envious of couples who can lie together in bed in the dark and chatter away easily, intimately” (Hannan, 2012). Hallberg and Barrenas (1995) found hearing impairment to be a source of annoyance for the spouse of the individual with the impairment. In interviewing both males with hearing loss and their spouses, they found the hearing loss to have a substantial affect on the spouse through repercussions such as negative influences on the intimate relationship. These results were echoed by Hallam, Ashton, Sherbourne, and Gailey (2008) who found that partners and families of individuals with hearing loss often experience increased interpersonal stress because of the required behaviour changes, such as a modification in communication habits, as well as social and recreational activities. Consequently, hearing loss is not only an individual problem, but also a social one (Trychin, 1991).

There are many causes of hearing loss, including diseases (e.g. otitis media and meningitis, otosclerosis, Meniere’s disease); congenital infections (e.g. neonatal herpes simplex virus, congenital syphilis); ototoxic substances, that is substances toxic to the auditory system and its tissues (e.g. antibiotics such as neomycin and streptomycin); genetics, resulting in conditions such as Usher’s and Waardenburg syndromes; and aging, resulting in age-related hearing loss, or presbycusis (Roizen, 2003; Yost, 2007). Beyond these causes, exposure to excessive sound leads to noise-induced hearing loss (NIHL) (Yost, 2007). NIHL is defined as changes in auditory function resulting from excessive exposure to intense levels of sound (Yost, 2007). That is, prolonged duration to, or increased intensity of sound can damage the hearing system, resulting in permanent hearing loss. While data are ambiguous as to whether NIHL rates are increasing, both leisure and work environments remain sufficiently noisy to pose risk to hearing health for a large sector of Canadians. The field of hearing conservation studies possible ways in which this NIHL can be reduced.

NIHL is a somewhat unique form of hearing loss, in that it is essentially the only entirely preventable form of this injury. Historically, the focus on noise-related hearing problems has been placed largely on adults. Specifically, much research has centered around occupational sound exposure and acoustic trauma experienced by specific groups, such as soldiers (Harrison, 2008). More recently, public attention surrounding the risk of NIHL has shifted, with a new focus being placed on both hearing conservation in young people and the effects of sound exposure due to leisure activities. Governments, including both the provincial and federal levels in Canada, have taken steps to reduce occupational sound exposure, which in turn should decrease the risk of NIHL (Canadian Centre for Occupational Health and Safety, 2009). Through both legislative and educational approaches, many steps are currently being taken to reduce exposure to leisure sound. For instance, France has introduced legislation which both limits output volume on personal music players to a maximum of 100 dBA and requires the affixation of a label warning consumers of the potential for hearing damage (Keith, Michaud, & Chiu, 2008). More locally, Member of Parliament Judy Wasylycia-Leis brought forth an amendment to the Hazardous Products Act, aiming to reduce sound emissions of children's toys from the current level of 100 dBA, when measured at arm's length, to a safer level of 75 dBA (Canadian Association of Speech-Language Pathologists and Audiologists, 2009).

In addition to policy-based enforcement strategies, organizations concerned with hearing health are attempting to decrease NIHL in young people through the administration of targeted hearing conservation programs (HCPs), such as *Sound Sense* (The Hearing Foundation of Canada, 2005), *Listen to Your Buds* (The American Speech-Language Hearing Association, 2006), and *Don't Lose the Music* (The Royal National Institute for Deaf People, 2011).

There are two general types of HCPs: occupational and non-occupational. According to Royster and Royster (1986) occupational HCPs have a single goal: to prevent NIHL caused by exposure to occupational noise. With this narrow focus, occupational programs target noise in the workplace, and often do so through regulatory measures affecting both employees and management. An example of such a program is *WorkSafeBC: Sound Advice*, a guide to occupational HCPs across the province of British

Columbia (Worker's Compensation Board of British Columbia, 2006). *WorkSafeBC: Sound Advice* provides information regarding areas such as required program components, noise measurement, education and training, engineered noise control, hearing protection, posting of noise hazard areas, hearing tests, and annual program reviews.

Comparatively, non-occupational HCPs are much broader in focus. Several of these programs designed for youth (e.g. *Sound Sense*, *Listen to your Buds*, *Don't Lose the Music*) have similar goals: to educate students, teachers, and families on the effects of NIHL and often tinnitus, as well as to provide prevention techniques for these injuries (Griest et al., 2007; The Hearing Foundation of Canada, 2005). Compared against the regulatory approaches often used in occupational HCPs, non-occupational programs often approach these goals through self-regulation mechanisms, such as targeting lifestyle behaviours of the population of interest through an increase in knowledge (Griest et al., 2007; The Hearing Foundation of Canada, 2005). Primarily information-based, these programs aim to provide children with the knowledge necessary to support them in making healthy hearing decisions in their daily lives (e.g. turn down the volume, take breaks from noise, wear hearing protection). Despite these efforts to educate individuals of the risks surrounding NIHL, public response has been minimal (Sobel & Meikle, 2008).

Many researchers and healthcare professionals acknowledge and engage in a predominantly biomedical approach to healthcare. This status quo has created a prominent gap concerning preventive care across many areas of health, including that of hearing conservation. According to Breslow (1999), every person has an individual level of health located at some point on a spectrum ranging from disease and injury avoidance to health promotion. The World Health Organization (2012) defines health promotion as “the process of enabling people to increase control over, and to improve, their health. It moves beyond a focus on individual behaviour towards a wide range of social and environmental interventions.” Gold and Miner (2002) expand on this definition, claiming that this process of health promotion involves any planned combination of supporting factors (e.g. educational, political, environmental) conducive to healthy lifestyles for

populations. The concept and practice of disease prevention is widely understood across many health disciplines; unfortunately, this concept of health promotion has yet to extend into many frontline approaches to healthcare. However, a health promotion-based approach to healthcare has been used in several areas, including obesity prevention (Tucker, Irwin, Sangster Bouck, He & Pollett, 2006), smoking cessation (Bissell, Fraser & Tara, 2011), and hepatitis C transmission reduction (Dwyer, Fraser & Treloar, 2011). Despite efforts put forth by several researchers (Nadler, Bat-Chava, & Shockett, 1998; Quick et al., 2008; Sobel & Meikle, 2008), health promotion theory has yet to be integrated into the field of hearing conservation. HCPs are generally aimed purely at injury avoidance, with practitioners, program designers, and policy makers not incorporating the extra steps of health promotion and primary prevention.

The first section of this paper addresses the benefits of incorporating health behaviour theories into a health promotion-based design of HCPs. The constructs of the Theory of Planned Behaviour (TPB) (Ajzen, 1991) are aligned with the components of a Canadian HCP, illustrating the strengths and weaknesses of such programs. The weaknesses are then addressed, and areas in which changes may lead to improved program effectiveness are suggested. Using information gleaned from this analysis, the second section of this paper addresses an identified research gap. Suggestions for program improvements are then provided based on results from this investigation.

1.1 Theoretical Approach

A theoretical approach has been adopted in order to more fully understand which components of a HCP are fundamental to the improvement of hearing health among elementary school children, the focus of which is to reduce the risk of NIHL. Behavioural change theories can be used as tools to help understand and explain those factors that influence human behaviours, such as behaviours related to health (McKenzie, Neiger & Smeltzer, 2005). As noted by Glanz, Rimer, and Viswanath (2008), the literature provides strong evidence of the benefits of incorporating behaviour change theories into health promotion program development, because theoretically grounded programs are often more effective than their atheoretical counterparts. The benefits of incorporating behaviour change theories into health promotion programs avail in many areas of

healthcare research, including program development, behaviour prediction, and outcome measurements. Examples of the application of behaviour change theories in health promotion include the development of a program designed to predict mothers' intentions to limit their infants' sugar intake frequency (Beale & Manstead, 1991), the prediction of behaviour change resulting from a smoking cessation intervention (Babrow, Black, & Tiffany, 1990), and the outcome measurement of a program designed to increase vegetable and fruit consumption (Anderson et al., 1998). Despite the common integration of these theoretical approaches across many fields of healthcare, the current approach to the development, implementation, and evaluation of HCPs remains predominantly atheoretical.

There are numerous models and theories designed to explain and predict behaviours and behaviour change. Behaviour change theories popular in health sciences research include the Transtheoretical Model (Prochaska, 1984), the Health Belief Model (Rosenstock, Strecher, & Becker, 1988), Social Cognitive Theory (Bandura, 1989), the Theory of Reasoned Action (Fishbein & Ajzen, 1975), and the Theory of Planned Behavior (Ajzen, 1991). Each of these theories brings with it its own strengths and weaknesses. Upon examination of typical HCP components, it became apparent that many of these components align closely with the constructs of TPB, making it the optimal theoretical grounding for this analysis. With this theoretical grounding, program components essential in the quest to achieve long-term behaviour change with regards to hearing health were identified.

1.2 The Theory of Planned Behavior

The Theory of Reasoned Action is a decision-making theory that attempts to explain human behaviour with regards to volitional behaviours (Fishbein & Ajzen, 1975). Since its inception, much positive research has emerged on the efficacy of this theory. For instance, two meta-analyses conducted by Sheppard, Hartwick, and Warshaw (1988) found strong predictive utility with regards to both behavioural intentions and behaviour. This prediction and explanation of behaviour is based on the three major constructs of intention, attitude, and subjective norms (Rye, 1998; Sobel & Meikle, 2008). The first construct, *intention* to perform the behaviour, is the central factor in determining action

(Ajzen, 1991). This construct refers to the likelihood of engaging in the behaviour of interest, and is determined by the other constructs of the theory: attitude and subjective norm. The greater an individual's intention to engage in the behaviour of interest, the more likely actual performance will occur (Ajzen, 1991).

The second construct of the Theory of Reasoned Action is the individual's *attitude* toward the behaviour (Ajzen, 1991). According to Fishbein and Ajzen (1975), individuals form beliefs about objects by associating these objects with specific attributes. Favourable or unfavourable association of these attributes with the behaviour of interest results in individual acquisition of a specific attitude toward the behaviour. In other words, attitude refers to the favourable or unfavourable appraisal of the behaviour of interest (Ajzen, 1991). This construct of attitude (A) can be quantified and defined as being directly proportional to the summation of the product of the strength of each salient belief about the behaviour (b) and the individual's subjective evaluation of the belief's attribute (e) (See equation 1) (Ajzen, 1991; Rye, 1998):

$$A \propto \sum_{i=1}^n be \tag{1}$$

That is to say, attitude can be described as the individual's beliefs about the likelihood of the specific outcomes multiplied by a personal evaluation of these outcomes (Rye, 1998).

The final construct of this theory is the social factor *subjective norm*. In the Theory of Reasoned Action, subjective norm refers to an individual's perceptions of social pressures surrounding engagement in the behaviour of interest (Ajzen, 1991). Specifically, subjective norm refers to the individual's perception of whether significant others view the behaviour as important, and revolves around perceived peer views and social pressures involved with the behaviour (Ajzen & Albarracin, 2007; Sobel & Meikle, 2008). As with the other constructs, Ajzen (1991) has quantified subjective norm (SN), defining it as being directly proportional to the summation of the product of the strength of each normative belief (n) and an individual's motivation to comply with the wishes of others (m). (See equation 2):

$$SN \propto \sum_{i=1}^n nm \quad (2)$$

More simply, these perceptions can be understood by multiplying the individual's normative beliefs by the motivation to comply with the wishes of others (Rye, 1998).

A limitation to the Theory of Reasoned Action is that it fails to address behaviours over which people do not have complete volitional control (Ajzen, 1991). To overcome this limitation, Ajzen (1988) expanded on the Theory of Reasoned Action in 1988, adding the fourth construct of *perceived behavioural control*. This expansion led to the development of the TPB (Ajzen, 1991). Perceived behavioural control reflects an individual's perception on the ease or difficulty of engaging in a specific behaviour, and therefore perceived capability of choosing to engage (Ajzen, 1991; McKenzie et al., 2005). It is important to note that perceived behavioural control changes with regards to both the current situation and the behaviour of interest, and is not a generalized predisposition of an individual. Again, Ajzen (1991) has quantified this construct, noting that perceived behavioural control (*PBC*) is directly proportional to the summation of the product of an individual's belief of control over the behaviour (*c*) and the individual's perceived power of the control factor that acts to facilitate or inhibit behavioural engagement (*p*) (See equation 3):

$$PBC \propto \sum_{i=1}^n cp \quad (3)$$

While it is evident that actual behavioural control plays an important role in engaging in the behaviour of interest, as acknowledged in both the Theory of Reasoned Action and TPB, Ajzen (1991) noted that perceived behavioural control is an equally important concept, as it impacts intentions to perform a behaviour, consequently impacting actual engagement in the behaviour of interest. According to TPB, knowledge of an individual's perceived behavioural control is important in predicting actual behavioural achievement (Ajzen, 1991). Support of this claim was provided by Madden,

Ellen, and Ajzen (1992), who compared the predictive abilities of the Theory of Reasoned Action and the TPB for a variety of common behaviours ranging in levels of perceived control (e.g. exercise, getting a good night's sleep, doing laundry, taking vitamin supplements, washing one's car). Results from this study indicate that the ability to successfully predict behaviours over which individuals perceive low levels of control is significantly greater for the TPB than for its predecessor, the Theory of Reasoned Action (Madden et al., 1992).

Even if attitudes and subjective norms toward the behaviour are strong, without perceived behavioural control, intention to change is likely minimal (McKenzie et al., 2005). Despite this, if an individual does not intend to engage in behaviour change, perceived behavioural control will not have any effect on actual behaviour (Rye, 1998). From this perspective, if two individuals have equal intentions regarding behaviour change, the individual who perceives more control over the behaviour will be more likely to engage (Rye, 1998). The example Ajzen (1991) used to illustrate this concept involved the behaviour "learning to ski." If two individuals both have equally strong intentions to learn to ski, the individual with more perceived control over the behaviour is more likely to both intend to engage in the behaviour and to be successful in actually learning to ski (Ajzen, 1991). This theory is summarized in Figure 1.

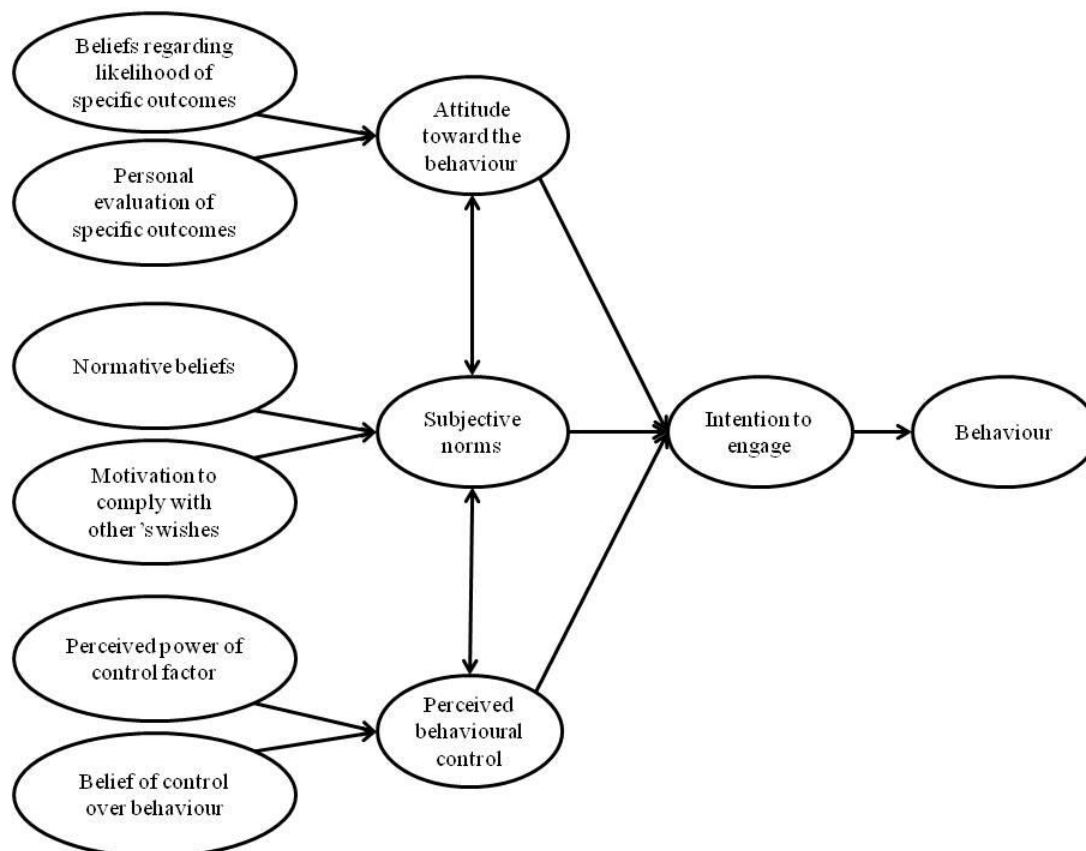


Figure 1: The Theory of Planned Behavior, adapted from Ajzen, 1991 and Rye, 1998.

The TPB was applied to the analysis of HCPs for children for two principal reasons. Firstly, although HCPs tend to be atheoretical interventions (i.e. not designed around or grounded in any behaviour change theory), the constructs of TPB, when compared with other behaviour change theories, can more easily be aligned with typical HCP components. This alignment provides a strong theoretical base for understanding and improving these programs. Secondly, behaviours not under complete volitional control, such as sound exposure and hearing conservation behaviours, are more adequately explained with TPB than related alternative theories, such as the Theory of Reasoned Action (Ajzen, 1991). The TPB was used to identify existing program components, as well as those which are missing and whose addition have the potential to strengthen the program and improve long-term change in hearing health behaviours among the target audience.

1.3 Sound Sense

Sound Sense was chosen to stand in as an extended example for this comparison. *Sound Sense* is an interactive and entertaining HCP that has been implemented across much of Canada to students in grades four through six by the Hearing Foundation of Canada and its partners. Facilitation of the program involves a 30-minute interactive presentation, as well as a 10-minute video. The presentation begins with an introduction to the topic, followed by a “Sounds We Love” segment. This student-led portion of the presentation is designed to have students discuss their favourite sounds, thereby increasing individual awareness regarding life changes that would occur if they were to lose their hearing. The next portion of the presentation is the *Sound Sense: Save Your Hearing for the Music* video, featuring two animated characters who teach teenage musicians the importance of hearing conservation. The video introduces students to the basic anatomy and physiology of the hearing system, the importance of healthy hearing habits, and actions students can take to protect their hearing. Following the video, students engage in a facilitated discussion, in which this information is reviewed and reinforced. Succeeding this review is an exercise with a sound level meter, during which the output of the ear buds of students’ or teachers’ personal music player is measured. Finally, the program concludes with a discussion about ways in which students can engage in healthier hearing habits and protect their hearing. Program materials for *Sound Sense* include stickers, ear plugs, and parent information sheets, which are given to the students; a poster-sized decibel chart comparing common noise sources against their respective intensity levels, which is left in the classroom; and teacher and student feedback forms.

Sound Sense has two primary goals. Firstly, the Hearing Foundation of Canada hopes to educate students, families, and teachers on NIHL and prevention techniques. This goal is unique in that, although the program is directly targeting students, it also indirectly targets families and teachers. This program extension is important because the incorporation of families and teachers into the program can allow effects to persist beyond simply the academic aspects of these children’s lives. The second goal of this program is to encourage the adoption of HCPs into core health curricula in schools (The Hearing Foundation of Canada, 2005). The importance of this goal lies in the lack of

information surrounding sound and hearing conservation currently taught in Canadian elementary schools. For instance, the Ontario curriculum outlining science and technology for students in grades one through eight includes a unit on light and sound for grade four students. Students are required to learn the basic physics of sound, as well as basic anatomy of the human auditory system. However, no aspect of this curriculum addresses the dangers of excess sound exposure and the importance of hearing conservation, beyond the comment that “personal music players can be played at volume levels that...are potentially damaging” (Ontario Ministry of Education, p. 91). Despite evidence of the problems of noise and NIHL among children, most school curricula fail to incorporate lessons surrounding this topic (Griest et al, 2007).

The reasons for choosing *Sound Sense* for this analysis are three-fold. Firstly, the National Centre for Audiology at Western University, the location for this research, has worked with the Hearing Foundation of Canada and *Sound Sense* throughout much of the development and implementation of the program. This work has provided the researchers with an in-depth knowledge and understanding of the program. Secondly, this program is frequently implemented throughout Canadian elementary schools. Consequently, research regarding improvement of *Sound Sense* may greatly impact future Canadian students. Finally, the content of this program is comparable with that of other HCPs designed for and implemented with youth. Therefore, the results of this analysis can be considered during the revision or creation of these programs.

1.4 Aligning Theory and Program

In understanding a HCP from a TPB viewpoint, it is important to align the four theoretical constructs with the program’s components. A summary of this alignment is provided in Table 1.

Table 1: Aligning Theoretical Constructs with Program Components

Theoretical Construct	Program Component
Attitude	NIHL and hearing conservation information dissemination Group discussion of favourite sounds
Perceived behavioural control	Group and individual assessment of newly acquired skills
Subjective norms	Teen rock band members engaging in healthy hearing habits

The TPB construct *intention* to engage in the behaviour of interest is dependent upon the three remaining constructs: attitude toward the behaviour, perceived behavioural control, and subjective norms surrounding the behaviour. In this program, *attitude* toward the behaviour is addressed two ways. Firstly, beliefs surrounding the likelihood of desired outcomes due to behaviour change are addressed through the program goal of increasing education surrounding hearing conservation and NIHL. This goal is achieved by disseminating information, primarily to students in the program's target population. The provision of information such as the basic anatomy and physiology of the hearing system, the importance of hearing protection, and ways to engage in healthy hearing habits, is a key area of the program in which this aspect of attitude is addressed. Secondly, *Sound Sense* illustrates the positive effects of these desired outcomes through the "Sounds We Love" segment, in which children discuss their favourite sounds. This program component serves to help individuals make more positive their evaluations of the outcomes of behaviour change by encouraging individual and group assessment regarding the importance of hearing.

The second theoretical construct, *perceived behavioural control*, is clearly demonstrated when students engage in both group and individual assessments of the new knowledge they have obtained. Upon receipt of this information, students discuss ways

they have learned to protect their hearing and how they can incorporate this new knowledge into their everyday behaviour. This portion of the program assists students not only in understanding that they are able to engage in healthier hearing behaviours, but also that such behaviours are easy to change.

The final construct of *subjective norms* surrounding the behaviour has two components. Addressing individual motivation to comply with others' wishes is an intrinsic factor specific to each individual. While in theory this personal attribute *could* be addressed through a health promotion program, it is likely that one that attempts to make more positive an individuals' perceptions of others beliefs will see more success. This component, however, is often overlooked by current HCPs. The example program *Sound Sense* can be used to illustrate this. The only interpretable incorporation of subjective norms into program implementation is the use of a teenage rock band comprised of individuals presumably influential to the target audience.

With regards to sound exposure and hearing conservation, addressing subjective norms would require programs to incorporate information regarding the target audience's attitudes toward related behaviours, including wearing hearing protection devices, voluntarily exposing oneself to loud sound, and engaging in other healthy or unhealthy hearing behaviours.

1.5 Alignment Outcomes

An essential, but generally insufficient component of any health promotion program is the integration of new information. The introduction of new information relating to the behaviour of interest can act to change the target audience's attitudes and perceived behavioural control regarding this behaviour (Ajzen & Albarracin, 2007). From a TPB perspective, these two constructs are essential in creating long-term behaviour change. As can be found in many HCPs, *Sound Sense* is successful in including program components which fulfill these two behaviour change requirements, as outline in the TPB. However, as delineated in the above analysis, there is a prominent gap surrounding the incorporation of *subjective norms*. If a health promotion program can create a positive connotation surrounding engagement in a positive behaviour, or a negative connotation

surrounding engagement in a negative behaviour, then the social pressures surrounding that behaviour are likely to change. An example of the effects of subjective norms lies in the smoking habits of North Americans. In recent years, health promotion programs encouraging smoking cessation have contributed to the shifting of subjective norms surrounding this behaviour. Since the 1970s, not only has the number of smokers in the United States decreased substantially, but those who do smoke have shifted from central members of their social circles to peripheral ones (Christakis & Fowler, 2008). Due to social pressures surrounding smoking, members of the same social circle have been found to quit smoking simultaneously, resulting in the development of self-reinforcing subjective norms. Smoking behaviours of individuals within social circles have been shown to influence individual interests in smoking behaviours simply because of the resulting alterations in the perceptions of smoking acceptability (Christakis & Fowler, 2008). While changing individual behaviours is often an easier task than that of changing subjective norms, inclusion of the latter in any behaviour change program is imperative, especially if these created behaviour changes are to be longstanding, as illustrated in the above example.

According to the constructs of TPB, students receiving a HCP, such as *Sound Sense*, will be more likely to accept the program and actively engage in long-term behaviour change if they believe that significant others, such as friends, teachers, and parents, view healthy hearing habits as important. There is already research regarding areas such as the importance of subjective norms surrounding sound exposure and hearing conservation, as well as what these subjective norms are in specific occupations. However, there is still a prominent gap in the literature surrounding what these subjective norms are with regard to hearing conservation and sound exposure in elementary school children.

1.6 Subjective Norms in the Literature

One area in which researchers have questioned subjective norms of sound exposure and hearing conservation is illustrated by the work of Sobel and Meikle (2008). They noted that, despite the current efforts to improve hearing conservation among children, substantial barriers to the acceptance of these public health messages still exist. In an

attempt to break the previously-noted barriers between health promotion and hearing conservation, they addressed potential applications of various health behaviour theories in the field of hearing conservation. Their goal was to summarize the knowledge and experience gained through health communication interventions and to identify constructs applicable to hearing conservation in youth. One such theory they considered was the TPB, the theoretical underpinnings of the current research project. The authors note that attitudes and strategies toward behaviour change, such as incorporating the use of ear plugs or avoiding sound exposure, are greatly influenced by the subjective norms surrounding this behaviour. Furthermore, students who receive HCPs are more likely to engage in healthy hearing habits if they believe their parents, teachers, and peers identify this behaviour as important.

While attempting to identify the subjective norms associated with hearing behaviours, Quick and colleagues (2008) used TPB to examine hearing conservation behaviours of coal miners. One purpose of this study was to determine whether the subjective norms regarding the use of hearing protection devices among coal miners were positively correlated with behavioural intentions. In this study, the authors used a seven-point scale to directly measure whether participants believed that significant others would prefer that they wear hearing protection. Results from this study identified positive subjective norms to be a strong indicator of actual hearing health behaviours among this population. The information examined in this study demonstrates the acquisition of actual data surrounding subjective norms and hearing conservation; however, the authors aim was to acquire knowledge from a population not easily comparable with the population of interest in the current study.

A study by Nadler and colleagues (1998) addressed, in part, the subjective norms of grade three children as part of an internet quiz. Researchers administered a voluntary multiple choice quiz to grade three students across the United States, of which 114 responded. Most of these respondents indicated that loud music was “not cool” and that louder was not better while listening to music or playing with toys. However, it should be noted that 10 of the 15 quiz questions were presented in a right/wrong format. This format may have resulted in participants attempting to answer the quiz questions

“correctly,” or in such a way as to achieve a high score. Consequently, the authors postulate that the results of this quiz are more indicative of knowledge among the participants, rather than subjective norms.

It is clear that subjective norms regarding healthy hearing habits are of theoretical importance to the success of a HCP; however there is still ambiguity in the literature as to what exactly these subjective norms are for all individuals, including children. Despite this lack of formal understanding, there is some indication of these social pressures as perceived by both the media and advertisers. Upon exploring products designed for children, it became clear that many advertisers perceive social pressures to reflect a “louder is better” mentality among children and young adults, and use these perceptions to promote products. Such perceptions are indicated through product names, such as thudBUDS™ (Scosche Industries, 2011) and Monster Beats™ (Monster Cable Products, 2011). As well, similar messages appear in advertisements for such products. For example, the packaging for Earforce™ gaming headphones (Voyetra Turtle Beach, 2012) includes the slogan “If you’re serious about gaming, then get serious about sound.” There is comparable advertising for music television channels, such as Much Loud (Bell Media, 2012b) and Juicebox (Bell Media, 2012a), a children’s music television channel advertised as a music channel which can “finally” be left on “all day.” Such slogans reach beyond products such as headphones and in-home entertainment and can be found at events such as music festivals. For instance, the Virgin Mobile Festival, held in Toronto, Ontario in 2008 featured the slogan “If it’s too loud, you’re too old” (Cullman, 2008). Though a comprehensive review of media influences regarding sound was beyond the scope of this project, this brief insight provides some information as to social pressures surrounding this topic as perceived by advertisers.

The information gleaned from viewing a standard Canadian HCP through a TPB lens, coupled with the prominent gaps existing in current literature has informed the research question for this work: What are the subjective norms surrounding sound exposure and hearing conservation in children?

Chapter 2

2 Methods

The subjective norms of sound exposure and hearing conservation in children were elicited through the use of qualitative description, specifically through individual interviews-cum-photo elicitation. Qualitative description was chosen over other qualitative methodologies typically used in the health sciences (e.g. ethnography, grounded theory) because it provided a direct path for answering the research question and allowed for a pragmatic, non-abstract approach to analyzing the data (Sandelowski, 2000). Methods and documents were approved by the Office of the Research Ethics Board at Western University (Appendix A).

2.1 Sample

Participants ranged in age from 8 to 12 years. This age range was chosen because this is the age often targeted by hearing conservation programs for youth. Because there was no a priori theory at the outset of this research, participants were chosen based on convenience and accessibility (Kuzel, 1992). Participants were required to speak and understand English proficiently enough to engage in an interview on the topic of sound exposure and hearing conservation. Though not a component of the inclusion criteria, no participants discussed having previously been administered a hearing conservation program, either at school or elsewhere. Interviews were conducted until data were deemed sufficient through the redundancy of occurring themes, and did not extend beyond this point (Kuzel, 1992). This resulted in a total of 12 interviews, with 7 females (mean age: 10.3 years; standard deviation: 1.7) and 5 males (mean age: 9.6 years; standard deviation: 1.1). No personal information beyond age and gender identity was collected from participants.

2.2 Interviews

Before each interview, a letter of information (Appendix B) and an assent form (Appendix C) were provided to each participant. Each parent/guardian was provided with a letter of information (Appendix B) and a consent form (Appendix D). To ensure participants did not feel pressured by the presence of their parents/guardians, once the

parent/guardian had left the interview room and the interview was to commence, the researcher verbally confirmed participants' willingness to participate. The researcher made clear the participants' right to withdraw at any point previous to de-identification of the data with no repercussions. De-identification occurred simultaneously with transcription, within a few weeks after each interview.

Interviews ranged from 10 to 25 minutes in length. Each interview was audio-recorded and transcribed verbatim. Interviews were conducted in a quiet one-on-one setting of the participant's choice. This was most often the participant's or the interviewer's home. Interviews took place during late morning or early afternoon, depending on the participant's preference. Each participant was offered the opportunity to have a parent/guardian present for the interview. However, this opportunity was declined by all 12 participants and their respective guardians, and only the researcher and participant were present during the interviews. Throughout the data collection process, the interviewer's comfort level with participants, as well as interviewing skills, improved, resulting in more in-depth participant responses. These later interviews provided information reflective of that gathered during initial interviews, so all interviews conducted were included in analysis. It is important to note that the interview settings (e.g. location, time, interviewer's attributes) likely affected the interview. As this is an innate characteristic of this method of data collection, alteration of these interview settings may have resulted in the acquisition of different data.

Each interview followed the same predetermined guidelines (Appendix E), allowing flexibility for the researcher to provide explicit encouragement to the participant to expand on thoughts which would yield valuable information. Interviews began with the interviewer asking participants whether noise and their ears are ever a topic of conversation and their thoughts on why they do or do not discuss this topic. This was followed by participants being asked questions regarding their thoughts on sound exposure, feelings evoked by a variety of noisy situations (e.g. classroom noise, noise on the school bus, school dances, concerts), and their reactions to classmates requesting volume reduction at or wearing earplugs to loud social situations, such as school dances. Participants were also given a brief overview of information provided in typical HCPs

(e.g. dangers of loud noises, how to prevent hearing loss) and asked to explain why they would or would not engage in healthier hearing behaviours if they were taught this information through a HCP at school.

Photo elicitation, the act of inserting photos into standard interviews (Collier & Collier, 1986), was used as an interview tool. Photos are provided in Appendix F. The purpose of including photo elicitation was to assist participants in verbalizing their thoughts, to provide a medium for voicing different thoughts than those educed through purely verbal interviews, and to allow comfortably quiet times in the interview during which participants could process their thoughts without feeling the obligation of an immediate response.

2.3 Analysis

Data analysis for this research was guided by Miles and Huberman (1984), as well as by Appleton's (1995) interpretation of these views. According to this approach, data analysis consists of three concurrent activities, continuing both throughout and upon completion of data collection: data reduction, data display, and conclusion drawing/verification. Although these activities occurred concurrently in an iterative analysis process, they are presented chronologically for the sake of clarity.

Data reduction is the process of “selecting, focusing, simplifying, abstracting, and transforming” data (Miles & Huberman, 1984, pp. 21) throughout data analysis to focus and organize the data in such a way as to allow conclusion drawing and verification. Interviews were transcribed by a third party; however the field researcher confirmed each transcription twice by reading the transcription while listening to the corresponding interview. Upon transcript confirmation, the field researcher read through each interview one time, making only mental notes; a second time, writing preliminary notes; and several more times, expanding these notes as themes emerged. Constant comparative analysis, as outlined by Stanley (2006), was implemented. A second researcher coded the transcripts simultaneously and independently, following the same technique. Upon completion of data coding, both sets of codes were input into NVivo™ coding software individually, maintaining each researchers' original analysis. This software was then used

to rearrange the data from their original sequential order of the narrative text into a more functional grouping of themes. At this stage, both sets of coded data were printed, with each set containing an identifier corresponding to the respective researcher.

Data display refers to the organization of information in a way conducive to drawing and verifying conclusions. The field researcher compared both sets of reduced data, merging the individual sets of codes into one combined set of data. Data were presented as narrative text, specifically with the use of important data excerpts. Through this process, the field researcher became familiar with the data, resulting in the emergence of four apparent themes, each containing several sub-themes.

Conclusions were drawn throughout the analysis process and agreed upon by both researchers after discussing the combined data and emergent themes. Trustworthiness of the data was tested throughout the analysis process.

2.4 Trustworthiness

According to Guba and Lincoln (1981), it is the researcher's responsibility to convince both the audience and the self that the results are worth heeding; in qualitative research, this can be accomplished by making clear the trustworthiness of the data. This research ensured trustworthiness through the criterion of neutrality as outlined by Guba and Lincoln (1981). This was achieved through the incorporation of both truth value and consistency throughout the research process.

Truth value is evaluated against the criterion of credibility (Guba & Lincoln, 1981). Guba and Lincoln (1981) note that credibility is determined by returning to participants with both the original data and the researcher's interpretations, and asking participants whether they believe the results of the analysis to be plausible. To ensure credibility in the current research project, upon completion of data analysis, the researcher engaged in member checking with two interview participants and discussed the interpretation of the data. This allowed participants to ensure that the data had been presented in a way reflective of their intentions. Both participants agreed with and understood the interpretation of the data; one participant expanded on the presented

themes, providing reinforcement of the data analysis and interpretation. Member checking was audio-recorded, and this expansion was included in the results.

The consistency of the results in this study is demonstrated through the criterion of auditability, or the ability of another researcher to follow the decisions made throughout the research process (Sandelowski, 1986). Specifically this was achieved through an explanation or justification of each decision made throughout the research process, as outlined by Sandelowski (1986). Transparency of these decisions ensured comparable, and not contradictory, results by other researchers, if provided with the raw data. This was demonstrated through the use of two researchers, both the author of this paper as well as the researching supervisor, a senior researcher at the University of Western Ontario, independently analyzing the data, resulting in the coding of similar and comparable themes.

Chapter 3

3 Results

Four major themes emerged from analysis of interview data: (1) knowledge regarding sound exposure and hearing conservation; (2) stigmatization surrounding the use of hearing protection devices (HPDs) in social settings; (3) emotional responses relating to sound; and (4) situational control influencing behaviour change. Within these themes, various subthemes emerged, eliciting information related to the research question. In the interest of transparency, it is important to note that while the primary themes stemmed from the interview questions, the interviewer did not induce the prominent subthemes which subsequently developed.

3.1 Knowledge

Three subthemes pertaining primarily to a lack of knowledge regarding sound exposure and hearing conservation arose throughout the interviews: lack of interest, lack of awareness, and incorrect knowledge.

Lack of Interest

At the outset of each interview, participants were asked whether noise or their ears are something they ever think about or discuss. Each of the participants responded as to indicate a lack of interest regarding this topic. Several participants explicitly stated the perceived banality of the topic, with statements such as, “It’s not something of interest,” “[We] like to talk about things... more interesting than our ears,” “It just doesn’t occur to me,” and, “It just doesn’t come up.” From these responses, participants were probed to explain further their lack of interest. Such explanations included responses such as, “I wouldn’t think of it because I would be having fun,” and, “We’re [busy] talking about everything else.” One participant directly addressed the related subjective norms, stating, “It’s just...not that popular a thing.”

Lack of Awareness

The second subtheme that surfaced was the lack of awareness among this population. When asked if she ever considered what happens to her ears during noisy situations, one participant responded, “Only when it’s really loud.” This was echoed by other participants, with statements such as, “I just don’t think about it,” “It doesn’t really matter. It’s just noise,” and, “I just don’t really think that...my ears will be damaged.” One participant did indicate awareness of the topic, saying, “What’s the point of turning it up so loud if you can already hear”? She then expanded on this thought, noting, “It’s kind of pointless because... you’re just damaging your ears.”

Incorrect Knowledge

Despite demonstrating awareness of the perils of excessive sound exposure, this same participant displayed incorrect knowledge in the area. When asked if she considered what could be happening to her ears in noisy situations, she responded with, “Sometimes I think my ears are going to pop or something.” This theme of incorrect knowledge was evident among many participants. As noted above, awareness of the topic was lacking, with few participants claiming even minimal knowledge of sound exposure and hearing conservation. The few participants who initially exhibited knowledge in this area also demonstrated a prominence of misunderstandings and incorrect information. This was evidenced through discussions regarding considerations of environmental noise, when one participant made the statement, “It’s just in your environment around you, so I never really think that anything will happen to my ears.” Another participant discussed her response to noisy situations, such as on the playground at school, remarking that she, “doesn’t really...notice it anymore....Because it’s not headphones...where it’s directly inside your ear. It’s just the environment around you.” This incorrect assumption regarding an increased danger associated with headphone noise over that from the environment was also evident by another participant. When asked what she would think if she could hear the music from another’s headphones, she exclaimed, “It could break her eardrums because it’s so loud.”

Again, this theme of incorrect knowledge continued to precipitate when discussing the use of HPDs during loud social settings. One participant noted that she does not need earplugs, but would understand if others choose to use them because, “for some people, their ears are more sensitive [than others].” During member checking, participants’ perceptions surrounding HPD use in loud social settings were explicitly discussed. Referencing the use of ear plugs at a school dance, one participant stated, “[If] your ears get hurt by a loud sound, then don’t come. But if your ears are strong [and] they don’t get hurt by it, then you can go.”

3.2 Stigmatization of HPDs

In discussing HPDs with participants, it was quite evident that there is a strong stigma surrounding their use. Common subthemes which emerged with respect to this stigmatization include the perception that HPDs are only used by those with hearing loss and that the use of HPDs is not normal.

Association between HPDs and Hearing Loss

When asked how they would react to classmates wearing ear plugs to loud social events, such as school dances, three participants made an immediate association with hearing loss, rather than hearing conservation. That is, they believed that only students who were suffering from hearing-related problems would wear HPDs. This was illustrated when one participant stated, “I’d think it was kind of odd, like...they might have something wrong with their ears.” This misconception was also apparent when another participant exclaimed, “I think that they think their ear drums are going to explode.”

Abnormality of Using HPDs

Participants explicitly stated that it is not normal to wear HPDs during noisy social situations. This theme was evidenced through casual comments such as, “That’s weird” and, “I would think that’s sort of funny.” One participant even noted that he would approach the individual wearing earplugs, asking, “What are you doing”? Several participants explained their reasoning for this perception, with remarks including, “I think

that's a little weird, because if you're here for the dance it's usually music and dancing," "Why would you put them in for the whole dance? Because I mean, it's a dance. You're supposed to be having fun," "I feel like that's ridiculous because it's a school dance. It's meant to be loud.... You might as well just sit outside," and, "I would think it may be kind of odd, because the music's probably going to be pretty loud." When discussing this theme with a participant during member checking, she fully agreed with the perception of HPD use as being inconsistent with the goals of attending a social function, stating, "if you put earplugs on, then there's no point in coming." Only one participant had a positive response toward HPD use in such situations, stating, "I'd think that they were pretty smart to bring that."

Beyond these individual assessments of HPD use, participants also suggested that they believe others would perceive HPD use as weird. This understanding of the subjective norms surrounding the use of HPDs was evidenced through statements such as, "If they were someone really popular then I'd probably be even more surprised," "The popular girls would make fun of her," and, "I'd feel bad for them if people called her names." One participant related the negative views of this behaviour toward herself, stating, "I've never seen someone else do it, and it feels weird to come to music class wearing earplugs."

3.3 Emotional Responses Relating to Sound

Several prominent subthemes pertaining to emotional responses relating to sound materialized throughout the interviews: (a) music through the use of headphones is personal and isolating; (b) excessive or unwanted sounds engender negative feelings and reactions; (c) loud sounds in social settings indicate fun and excitement; and (d) individual sound level preferences conflict with perceived subjective norms.

Social Isolation through Headphone Use

The first theme regarding participants' emotional responses relating to sound is that of isolation through the use of headphones. Several participants noted that listening to music over headphones was more personal and isolating, compared with the use of

speakers. This was emphasized through statements such as, “You just want to listen to some music, not people talking,” and, “I just go into my room and I listen to music when I get stressed.”

Excessive Sounds Engender Negative Feelings

When discussing their emotional responses related to unwanted sound, including both noise and music, participants overwhelmingly responded with a negative reaction. Common emotions which arose during this discussion included irritation, frustration, stress, and anger. As one participant put it, “[I feel] annoyed because all the noise is driving me crazy.” This reaction was one that arose repeatedly throughout the interviews, with statements such as, “The noise, it bothers me,” “I don’t really like loud noise. It just makes me feel stressed,” “I get angry,” “[If] there’s a lot of noise then you can’t sit and relax,” and, “When I’m around lots of noise...it’s kind of frustrating.”

Many participants spoke of the classroom serving as a location where excessive noise was particularly upsetting. When discussing noise in the classroom, participants responded with comments such as, “I feel like going crazy,” “It’s so irritating,” and, “In a noisy classroom, I’d be frustrated or annoyed.” One participant expressed her discomfort with the problem of continually increasing classroom noise when she noted, “It makes me mad, because usually if it’s noisy, it’s really, really, *really* [emphasis added] loud.” Another participant echoed this statement, saying, “When it gets noisy at school, I feel upset because it’s...hard to concentrate on your work.”

Several participants noted excessive or constant background noise to be normal. When discussing noise at school, one participant stated, “You get used to it and...you have to work with it... You can’t whine about it all the time.” When discussing her emotional responses relating to excessive noise, another participant echoed these thoughts, saying, “I usually just ignore it...and just keep doing my work.”

Several participants stated that they found it rude when individual music played through headphones is audible to others. This was illustrated by one participant who noted, “You’d think it’d be a little bit rude to have it...that loud.” Another participant

echoed this thought, stating, “[I would be] annoyed because...people don’t want to hear that.” Two participants placed themselves in the shoes of an individual with audible headphones, commenting, “I’d be embarrassed if other people could hear my music,” and, “[I would be] embarrassed because the music is so loud and everyone else can hear it.”

Loud Sounds Indicate Fun and Excitement

The third subtheme which emerged with respect to participants’ emotional responses relating to sound is the thought that loud sounds indicate fun and excitement in social settings. This was noted explicitly by nine participants, through statements such as, “When there’s loud noise, I just feel excited,” “It feels like it’s a party,” and, “If there was a big crowd it would...make you feel kind of excited.” As well, several participants alluded to the excitement created through loud sounds by voicing contrary emotional responses relating to quiet situations. For instance, when asked about her reactions to different types of noise, one participant responded, “When it’s really quiet, it makes you feel kind of uncomfortable.” This thought was mirrored by a second participant who was quick to note that he, “would be less excited” if the music at a school dance were turned down. Only one participant did not associate fun and excitement with loud sounds in social situations. It should be noted that this was the same participant who was alone in viewing HPD use as a positive behaviour.

In communicating the excitement associated with loud sounds, it became apparent that many participants think that music *should* be loud in social situations. When asked how he would react to a classmate requesting the music be turned down at a school dance, one participant responded with, “Why would you want to do that? I mean, it’s a school dance. It has to be loud.” This perception was clearly articulated among other participants, with statements such as, “It’s a school dance. It’s meant to be loud,” “It’s supposed to be loud [to] have fun,” “It’s supposed to be loud there,” and, “The music’s probably going to be pretty loud when you’re at those kinds of places.”

Individual Sound Preferences Conflict with Perceived Subjective Norms

The final subtheme which was highlighted in this section addresses the fact that while most participants find loud sound to be fun and exciting, their personal preference is for music to be played at a lower level than is typical during social situations. For instance, one participant stated, “If it’s really loud, I don’t like that because I don’t want to have to scream.... I’d want to turn it down.” Similar responses by other participants included, “I don’t like very loud music. It kind of bothers me,” and, “If the music was really loud...I wouldn’t be able to think straight.”

As noted throughout the theme of emotional responses relating to sound, participants view loud social situations as fun and exciting, but prefer music, both through speakers and headphones to be played at a lower volume than they believe to be considered socially acceptable. Despite these personal preferences, participants clearly indicated that they believe their peers have a “louder is better” attitude and prefer music to be louder than they do. For instance, when discussing her thoughts on why others play their headphones at levels audible to those around them, one participant stated, “They just want to be cool.” This association of loud music with, “cool” behaviour was echoed by others throughout the interviews, often during the discussion on behaviours during school dances and reactions toward classmates either wearing earplugs to the dance or requesting the music be turned down. Responses during this part of the conversation included, “The popular girls would make fun of her because she doesn’t really like loud noises,” “she would never do that because she loves loud music,” and, “I’d be kind of happy if they turned it down, but other kids might be upset because...they like it...loud.” One participant discussed her reactions toward others choosing to wear earplugs to a loud social event. While clearly bothered by the concept of a popular classmate engaging in this behaviour, she also noted that, “If it was a nerd, [she] wouldn’t feel that bad.”

3.4 Situational Control Influencing Behaviour Change

The final theme which emerged is the situational dependency of individuals’ likelihood to engage in behaviour change. All but one participant stated positive intentions to engage in behaviour change during noisy situations over which they believed they had control,

most commonly when using headphones. Participants spoke extensively about their good intentions, with statements such as, “I don’t want to lose my hearing, so I want to turn it down,” “It’s something I’ll be more careful about,” “If it’ll help your ears, I don’t see why not,” “If you’re listening to music, it’s easier to just turn it down” and, “With headphones, I would just turn it down.” However, this self-efficacy surrounding minimization of sound exposure waivered when shifting from headphone use to social situations. When discussing the likelihood of reducing sound exposure in these situations, participants responded with statements such as, “I just wouldn’t change it as much if I was outside playing with someone.... You can’t really turn down people,” “I just go with what anyone else thinks,” and, “It depends what kind of situation.” This theme was further reinforced through statements made with regards to the wearing of hearing protection devices, specifically earplugs, during social situations, such as “It’s a dance. You’re supposed to be having fun” and “If you put earplugs in, there’s no point in coming.”

Chapter 4

4 Discussion

The purpose of this research was to gain an understanding of the subjective norms surrounding sound exposure and hearing conservation in youth aged 8 through 12 years. Participants provided insight into their thoughts and perceptions of this topic. Several themes, each with its own respective subthemes, emerged from these results: (1) knowledge regarding sound exposure and hearing conservation; (2) stigmatization surrounding the use of HPDs in social settings; (3) emotional responses relating to sound; and (4) situational control influencing behaviour change. Although several aspects of these emergent themes do not apply directly to the subjective norms surrounding sound exposure and hearing conservation, they do provide valuable contextual information regarding the understanding and improving the effectiveness of HCPs for children in this age group, and therefore warrant discussion.

4.1 Knowledge

A distinct lack of knowledge regarding the topics of sound exposure and hearing conservation was prominent among participants. This theme was reinforced by an evident lack of interest and awareness surrounding the topic, with only one participant demonstrating awareness in this area and no participants expressing interest. As discussed by Ainley, Hidi, and Berndorff (2002), interest in a topic is associated with positive attitudes toward the topic. Therefore, a lack of interest surrounding a topic may be associated with less positive attitudes toward the related behaviour. Given the current study's grounding in TPB, this is an important concept, because positive attitudes toward a behaviour increase the likelihood of behavioural engagement (Ajzen, 1991). With regards to engaging in healthy hearing habits, this lack of interest in sound exposure and hearing conservation is likely to result in minimal positive attitudes surrounding engagement, and therefore minimal engagement in behaviours conducive to hearing conservation.

Another subtheme reinforcing this concept of minimal knowledge and deserving of attention was the recurring prominence of incorrect knowledge and misinformation

among participants. A display of incorrect knowledge surrounding the topic of sound exposure and hearing conservation was evident throughout the interviews. As noted above, the introduction of new information relating to the behaviour of interest can act to change attitudes regarding this behaviour (Ajzen & Albarracin, 2007). Building on this, this evident misinformation among participants could be perpetuating their current attitudes toward sound exposure and hearing conservation.

While not directly related to the research question, this recurrent theme of minimal knowledge regarding noise exposure and hearing conservation does provide information valuable toward understanding the effectiveness of HCPs. Overall, the combined lack of interest, awareness, and knowledge in this area are likely synergistically failing to facilitate positive attitudes toward hearing conservation and healthy hearing behaviours among this population.

4.2 Stigmatization of HPDs

The second theme which warrants discussion is the appreciable stigmatization surrounding the use of HPDs which became apparent throughout analysis. Two prominent subthemes emerged which support this result. Firstly, participants often associated the use of HPDs with hearing loss or excessive sensitivity to sound, as opposed to hearing conservation. That is, there was a strong belief that only students with hearing-related problems would wear HPDs during loud social events, such as school dances. While this misconception could be combined with the previous theme of lack of knowledge, addressing this particular misunderstanding separately can provide a more detailed understanding regarding the related subjective norms.

Secondly, participants explicitly stated a perceived abnormality of wearing of HPDs during noisy social situations. When asked to discuss their hypothetical reactions to a classmate or friend wearing ear plugs to a school dance, most participants made an immediate association between this behaviour and the term “weird.” Not only did participants view HPD use as abnormal, but they also perceived this view to be reflective of their peers’ beliefs. In other words, they believed negative social pressures associated

with the use of HPDs to be representative of the subjective norms surrounding this behaviour.

Much research to date has very clearly highlighted the stigma surrounding both hearing loss and hearing aid use present among many age groups (Erler & Garstecki, 2002; Héту, 1996; Jones et al., 1987; Kochkin, 1990; Noble, 1996); however, no studies were found which address the stigma, in any population, surrounding the use of HPDs. Beach, Williams, and Gilliver (2012) note that currently, individuals who choose to wear HPDs, such as earplugs, to loud social events are considered “early adopters,” because they have adopted such behaviours before their peers. Understanding factors that influence these individuals’ decisions to engage in this healthy hearing behaviour, as well as those factors affecting others’ decisions not to engage, may shed light on the related stigma found in the current study. As well, further research aiming to understand these perceptions and their development among children would prove beneficial by providing insight into possible approaches for making these subjective norms more positive. This knowledge could in turn provide insight toward improving behaviour change among this population with regards to HPD use.

4.3 Emotional Responses Relating to Sound

Through discussing noise exposure with participants, it became clear that sound, both when desired such as music through headphones, and when unwanted such as excessive classroom noise, elicits an emotional response. One example of this is evident through the theme of social isolation through headphone or earbud use. Participants noted that choosing to listen to music over headphones provides a more personal and isolating experience than do speakers. Similar results were echoed in the literature. For instance, Goldberg (2005) noted that MP3 or other personal music players are found to provide isolation from the outside world. Noted influences of music on biological, physiological, emotional, and behavioural responses, coupled with the auditory bubble created through headphone use (Heye & Lamont, 2010), could explain these results in the current study. When discussing situations during which participants can hear music from others’ headphones, participants had negative reactions, with many associating this behaviour with the term “rude.” Having the participants reverse roles in the situation, that is

mentally placing themselves as the individual with music audible to others, resulted in an association with the term “embarrassment.” The results indicative of this theme show that, while participants do enjoy experiencing music through headphones, they prefer that both they and others decrease the volume to prevent it from being audible to those nearby.

A second theme relating to emotional responses to sound is that of excessive unwanted sounds engendering negative feelings, such as irritation, frustration, anger, and stress among participants. Several participants identified excessive or constant background noise as something they should accept as “normal” and learn to tolerate. Comparable results were obtained by Wålinder, Gunnarsson, Runeson, and Smedje (2007), who used physiological indicators to measure stress responses of elementary school children. They found higher classroom sound levels to be associated with physiological responses indicative of increased stress levels (e.g. headache, fatigue, cortisol changes) among students. The results of the current study suggest that in situations with excessive noise, particularly those in which the noise is unwanted, individuals react negatively toward the situation.

Despite these negative feelings associated with excessive and unwanted sounds, it was also evident that loud sounds in social settings indicate fun and excitement. Results not only suggest excitement brought forth by loud social environments, but also evince the related subjective norms. It was clear that participants believe high intensity sounds to be a necessary ingredient in fun and exciting social settings; that is, music *should* be loud in social situations. Conversely, although participants perceive a “louder is better” mentality among their peers, individual sound preference is often toward less intense sound levels. Similar results were found among students in Switzerland aged 16-25 years (Mercier & Hohmann, 2002). Researchers found between 31 and 52% of individuals in this age group believe sound levels at night clubs, concerts, and techno parties to be too high. A comparable attitude was prevalent among participants in the current study, indicating a discrepancy between individual preferences and perceived subjective norms.

4.4 Situational Control Influencing Behaviour Change

The final result warranting discussion is the recurrent theme that participants' intentions to engage in healthier hearing habits were related to their perceived control over particular situations. Each participant was provided with a brief, verbal overview of examples of healthy hearing habits (e.g. turn down the volume, wear earplugs, walk away from the noise) taught during typical HCPs. Nearly all the participants expressed positive intentions to engage in healthy hearing habits during noisy situations over which they believed to have control. Most commonly, participants expressed intention to reduce the volume settings on their MP3 or other personal music players. However, when discussing healthy hearing habits in social situations, such as wearing ear plugs to a school dance or requesting the music be turned down, participants did not express intention to change their behaviours.

These results are in accordance with behavioural explanations of the TPB. Participants acknowledged feelings of minimal control over sound exposure in social situations. According to the TPB, this decreased perception of control results in decreased intentions to engage in the behaviour of interest (Ajzen, 1991). Combined, this information depicts the understanding that individuals in this population are highly receptive to individual forms of behaviour change, but will refrain from engaging in hearing conservation behaviours that may result in unwanted attention or the perception of being different. These results, while not directly applicable to the research question, again provide information beneficial to understanding the effectiveness of HCPs.

4.5 Conclusions and Future Directions

The perceived subjective norms surrounding sound exposure and hearing conservation reported by these participants are reflective of an environment inimical to healthy hearing behaviours. Additional research in this area would prove beneficial in expanding this understanding. For instance, these subjective norms could be explored among a larger population of students, including those who were not accessible via the current sampling strategy. This expansion could prove especially beneficial, because the limited sample size and convenience sampling approach utilized in the current research likely resulted in

data that is not fully reflective of the diversity of views which may emerge through sampling of a broader population. Additionally, such research could focus on understanding the effects which the social determinants of health (e.g. income, education, aboriginal status, gender, race, disability) have on individuals' perceptions of this topic and the related subjective norms. As was noted in Chapter 2, interview characteristics (e.g. interviewer qualities, such as gender, age, and ethnicity; participant interest level; previous exposure to interview topic) may have impacted the results obtained through this data collection approach.

Further research in this area, specifically an approach that acknowledges diverse social contexts and their demonstrated influences on individual behaviour and perceptions (Salancik & Pfeffer, 1978) could provide valuable information with regards to these subjective norms. For instance, such an approach may provide a more generalizable understanding of the subjective norms than was intended in the current study. Furthermore, alternative subjective norms could emerge that lead to a greater understanding of the roles of social context on the development of subjective norms within a particular population.

Research aiming to understand decision-making with regards to sound exposure and hearing conservation among those individuals who do engage in healthy hearing habits (e.g. those who choose to wear ear plugs during loud social situations) may provide insight regarding the encouragement of such behaviour among this population. The employment of various methodologies (e.g. ethnography, grounded theory) could provide different viewpoints and understandings of these subjective norms than those acquired in the current research project. It may also prove beneficial to more fully address media influences surrounding this topic, as this may provide information beneficial to the improvement of current HCPs.

Addressing these subjective norms (e.g. stigma of HPD use, perceived "louder is better" mentality) during development and implementation of HCPs could prove beneficial in improving the effectiveness, both short- and long-term, of such programs. Additionally, further research designed to quantify the importance of the four emergent

themes of the current study could provide an informed and pragmatic approach to the improvement of current programs. For instance, HCPs such as *Sound Sense* could be modified with the use of this information, through additions to the program such as the inclusion of a discussion regarding these subjective norms. Students could be encouraged to discuss their personal experiences related to loud sound exposure, such as situations in which sound was uncomfortably loud, results (e.g. temporary threshold shift, tinnitus) from engaging in loud activities, and their reactions to these situations. Such programs could also encourage students to discuss previous decisions to engage or not engage in healthy hearing habits, thus promoting discussion surrounding participants' thoughts and perceptions of their peers' reactions to such behaviour. It is clear that students are comfortable discussing their thoughts surrounding this topic when in a safe environment, such as during the interviews in which they participated. Including such discussions during administration of a HCP, such as *Sound Sense* could make students aware of their peers' thoughts on this topic, helping to dissuade current assumptions, and therefore bridge the gap between personal preferences and subjective norms.

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Appendix B: Letter of Information



Letter of Information and Consent Form for Participants' Parents/Guardians

Study Title

Exploring the Subjective Norms Surrounding Noise Exposure and Hearing Conservation in Children aged 8 through 12

Principle Investigator

Margaret F. Cheesman, National Centre for Audiology, UWO

Co-Investigator

Jill Lowther, UWO

Invitation to Participate

You are invited to participate in a research study exploring the subjective norms of noise exposure and hearing conservation in children. This letter is intended to provide you with the information you require to make an informed decision on allowing your child to participate in this research. Please take the time to read the information and feel free to ask questions if there is anything unclear to you. You will be given a copy of this letter for your records.

Summary and Purpose of Research

The purpose of this study is to explore the subjective norms of noise exposure and hearing conservation in children. In this study, we will be conducting one-on-one interviews with children to get a better understanding of how they view noise exposure and hearing conservation. This study will help us to advise appropriate changes in a current national hearing conservation program.

Eligibility to Participate

Your child is eligible to participate if he/she is between the ages of 8 and 12 years, and is able to speak English fluently enough to participate in a one-on-one interview.

Procedures

Should you agree to allow your child to be in this study, he/she will be asked to partake in a one-time one-on-one interview with the Co-Investigator to discuss noise exposure and hearing conservation. Audio recordings of the interview will be made to allow transcription and data analysis. Video recordings of the interview will be made to help understand what the child said (example: motions such as pointing and shrugging will be added into the transcription). The recordings will be transcribed and the transcriptions will be used to analyse what your child and other children think about noise and hearing conservation. Upon completion of the data analysis, the Co-Investigator will contact you to briefly meet with your child a second time. The purpose of this second meeting is to ensure that the researcher has interpreted the data in the way your child intended.

Estimated Time

The interview is estimated to take between 30 minutes and 1.5 hours, depending on how much your child wishes to talk about the subject

Location

The interview will take place in room 2236 Elborn College, or the child's home. This choice is up to you and your child, and is dependent on where you feel most comfortable.

Potential Risks, Discomforts, and Inconveniences

Your child may be uncomfortable discussing his/her thoughts and behaviours regarding hearing habits and noise exposure. If he/she appears uncomfortable at any point during the interview, the interviewer will confirm that your child wishes to continue, and make clear to your child that he/she can change his/her mind at any time.

Potential Benefits

Your child may find discussing noise exposure and hearing conservation during the interview to be beneficial in making him/her aware of healthier hearing habits. Even if your child does not find the interview to be directly beneficial, the information obtained will be used to advise a national hearing conservation program in potential changes to increase effectiveness.

Participation

Participation in this study is voluntary. You may decide to withdraw your child from this study at any time with no effect on your future treatment, employment, or academic status. If you decide to withdraw your child from the study before the study is complete, we will ask for your permission to retain and use the collected data. If you decline permission, your data and contact information will be destroyed. The last chance to withdraw from this study is during the second meeting with your child during which the Co-investigator will be ensuring that the data collected has been interpreted as intended by your child. After this meeting, the data will be depersonalized (information to identify particular children will be deleted), and removal of individual data will no longer be possible because we will not be able to determine which child provided the data.

Anonymity and Confidentiality

Personal or identifiable information collected will be solely for the purpose of contacting you and your child and arranging your participation time, as well as identifying your child's age to allow an understanding of how social norms vary with different aged participants. Transcribed interviews will be identified by participant number. Any names of people, places, schools, or other identifiers present in the transcript will be deleted. The audio and video recordings will be erased once the transcriptions have been verified as accurate.

Legal Rights

You do not waive any legal rights by signing this consent form. The investigators of the study claim responsibility for their actions.

If you have any questions about your rights as a research participant or the conduct of the study you may contact the Principle Investigator (contact information provided at beginning of letter) or the Office of Research Ethics at (519) 661-3036 or by email at

Version date: 29 July 2011

Project Title

Exploring the Subjective Norms Surrounding Noise Exposure and Hearing Conservation in Children aged 8 through 12

Statement of Consent

I have read the Letter of Information/Consent document, have had the nature of the study explained to me, and I agree to participate. All questions have been answered to my satisfaction.

_____	_____	_____	_____
Date	Participant's name (please print)	Parent/Guardian Name (please print)	Parent/Guardian Signature

_____	_____	_____
Date	Name of person responsible for obtaining informed consent (please print)	Signature

Appendix C: Assent Form for Participants

**Study Title**

Exploring the Subjective Norms Surrounding Noise Exposure and Hearing Conservation in Children aged 8 through 12

Investigators

Jill Lowther, Dr. Margaret Cheesman

Why are you here?

The researchers want to talk to you about noise. They want to learn more about what you think about noisy situations and how people around your age behave in these situations.

Why are they doing this study?

The researchers want to use this information to improve *Sound Sense*, a hearing conservation program for children your age.

What will happen to you?

If you want to be in the study you will be asked to sit down with Jill Lowther to talk about noise. She has a few questions she would like you to answer, and you can talk as much or as little as you feel comfortable.

Will the study help you?

Maybe. By talking about things like how you react to loud noises, you might start to pay attention to unhealthy hearing habits that you have. This might help you improve your hearing health. Even if you don't find our chat helpful, the information you share with me will be used to help other children later.

What if you have any questions?

You can ask any questions you want at any time before, during, or after our conversation. You can ask me, your family, or someone else.

Do you have to be in the study?

You do not have to be in the study. No one will be mad at you if you don't want to do this. If you don't want to be in this study, just say so. Even if you say yes now you can change your mind later. It's up to you.

I want to participate in this study.

Date	Participant's Name (Please Print)	Participant's Signature	Participant's Age
Date	Name of Person Obtaining Assent (please print)	Signature	

Appendix D: Consent Form for Parents/Guardians



Letter of Information and Consent Form for Participants' Parents/Guardians

Participant ID: _____

Study Title

Exploring the Subjective Norms Surrounding Noise Exposure and Hearing Conservation in Children aged 8 through 12

Principle Investigator

Margaret F. Cheesman, National Centre for Audiology, UWO

Co-Investigator

Jill Lowther, UWO

Invitation to Participate

You are invited to participate in a research study exploring the subjective norms of noise exposure and hearing conservation in children. This letter is intended to provide you with the information you require to make an informed decision on allowing your child to participate in this research. Please take the time to read the information and feel free to ask questions if there is anything unclear to you. You will be given a copy of this letter for your records.

Summary and Purpose of Research

The purpose of this study is to explore the subjective norms of noise exposure and hearing conservation in children. In this study, we will be conducting one-on-one interviews with children to get a better understanding of how they view noise exposure and hearing conservation. This study will help us to advise appropriate changes in a current national hearing conservation program.

Eligibility to Participate

Your child is eligible to participate if he/she is between the ages of 8 and 12 years, and is able to speak English fluently enough to partake in a one-on-one interview.

Procedures

Should you agree to allow your child to be in this study, he/she will be asked to partake in a one-time one-on-one interview with the Co-Investigator to discuss noise exposure and hearing conservation. Upon completion of the data analysis, the Co-Investigator will contact you to briefly meet with your child a second time. The purpose of this second meeting is to ensure that the data has been interpreted as intended by your child.

Estimated Time

The interview is estimated to take between 30 minutes and 2 hours.

Location

The interview will take place in room 2236 Elborn College, the child's home, or another location where you and the child are most comfortable having the interview held.

Potential Risks, Discomforts, and Inconveniences

Your child may be uncomfortable discussing his/her thoughts and behaviours regarding hearing habits and noise exposure. Shall he/she appear uncomfortable at any point during the interview, the Co-Investigator will confirm that your child wishes to continue, and make clear to your child that he/she can change his/her mind at any time.

Potential Benefits

Your child may find discussing noise exposure and hearing conservation during the interview to be beneficial in making them aware of healthier hearing habits. Even if your child does not find the interview to be directly beneficial, the information obtained will be used to advise a national hearing conservation program in potential changes to increase effectiveness.

Participation

Participation in this study is voluntary. You may decide to withdraw your child from this study at any time with no effect on your future treatment, employment, or academic status. If you decide to withdraw your child from the study before the study is complete, we will ask for your permission to retain and use the collected data. If you decline permission, your data and contact information will be destroyed. The last chance to withdraw from this study is during the second meeting with your child during which the Co-Investigator will be ensuring that the data collected has been interpreted as intended by your child. After this meeting, the data will be depersonalized, and removal of individual data will no longer be possible.

Anonymity and Confidentiality

Personal or identifiable information collected will be solely for the purpose of contacting you and your child and arranging your participation time, as well as identifying your child's age to allow an understanding of how social norms vary with different aged participants. Transcribed interviews will be identified by participant number. Any names of people, places, schools, or other identifiers present in the transcript will be altered.

Legal Rights

You do not waive any legal rights by signing this consent form. The investigators of the study claim responsibility for their actions.

If you have any questions about your rights as a research participant or the conduct of the study you may contact the Principle Investigator (contact information provided at beginning of letter) or the Office of Research Ethics at (519) 661-3036 or by email at

Project Title

Exploring the Subjective Norms Surrounding Noise Exposure and Hearing Conservation in Children aged 8 through 12

Statement of Consent

I have read the Letter of Information/Consent document, have had the nature of the study explained to me, and I agree to participate. All questions have been answered to my satisfaction.

Date	Participant's name (please print)	Parent/Guardian Name (please print)	Parent/Guardian Signature
Date	Name of person responsible for obtaining informed consent (please print)	Signature	

Appendix E: Interview Guidelines

Firstly, I'm just wondering whether noise and your ears are things you ever think about or talk about. Is it something that ever comes up? Now that you're thinking about it, can you think of reasons why you do/don't talk or think about noise and your ears?

I want you to picture yourself in this situation (Picture 1 – Appendix A). When you're in a noisy situation like this one, do you ever think about the noise? When you're in a loud, noisy place like this, do you ever think about what might be happening to your ears? Why/why not? It would be great if you could talk about how you would feel if you were the person in this situation.

Does the type of noisy situation change how you feel? I want you to think about how you've felt in noisy situations such as school dances, at concerts, playing video games. What about in noisy situations, such as when people are playing musical instruments, when you're on the bus, or when the classroom gets noisy? Can you talk about how you've felt in these types of noisy situations?

What other types of noisy situations change how you feel? Some examples of these feelings are excitement, anger, and frustration.

Okay, this time I want you to picture yourself in this situation (Picture 2 – Appendix A), where one of the children in this picture represents you, and the others represent other children in your class. How would you react if one of these children asked the DJ or a parent, teacher, or chaperone to turn the music down? Do your feelings about this change depending on who the student is?

What if one of these children wore ear plugs or ear muffs at the dance? What would you think about this student? Again, does it depend who the student is? Do you think your feelings would change if this person was one of your friends? If he or she was somebody you don't know very well? If he/she was popular?

What about this picture (Picture 3 – Appendix A)? What do you think of when you look at this picture? What if I tell you that the other people in this picture can hear the music coming from the headphones? What do you think about if I get you to imagine that this person (point to person

with headphones) with the headphones is you? What about if this person (point to bystander) is you?

Alright, now that we've discussed noise a little bit, I'm hoping you might talk to me about the types of ways you think you would act in noisy situations in the future. Remember, I want you to tell me what you really honestly think you would do. Your answers aren't going to get you into any trouble. I'm interested in what you *would actually* do, so you don't need to pretend you would behave better or differently than you really will. Some easy ways to protect your hearing are to turn down the volume, to take a break from the noise, or to walk away. If you learned ways you can protect your ears at school, do you think you would?

When you're by yourself, do you think you would do some of these things? Why/why not? If you think about some of these social situations that we just talked about (point to pictures), do you think you would do any of those things? Why/why not?

Appendix F: Interview Photos



Picture 1



Picture 2



Picture 3

Curriculum Vitae

Name: Lowther, Jill

Post-secondary Education and Degrees: University of Western Ontario
London, Ontario, Canada
2006-2010, BHSc.

Honours and Awards: Ontario Graduate Scholarship
2011-2012

Raymond Hétu Prize in Acoustics
2010

Related Work Experience Graduate Teaching Assistant
The University of Western Ontario
2010-2011

Presentations:

Lowther, J., Jennings, M.B., Cheesman, M. Subjective norms of noise exposure and hearing conservation in youth. Oral Presentation at the UWO Health and Rehabilitation Sciences Graduate Research Forum, London, ON; January 2012.

Lowther, J., Jennings, M.B., Cheesman, M. Subjective norms of noise exposure and hearing conservation in youth. Poster Presentation at the AAA Academy Research Conference, Boston, MA; March 2012.