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The risk perceptions of young people to amplified music at concerts and festivals in South Africa

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“Commit to the Lord whatever you do, and He will establish your plans”

Proverbs 11:5

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ABBREVIATIONS

NIHL	Noise-induced hearing loss
TTS	Temporary threshold shift
PTS	Permanent threshold shift
MIHL	Music-induced hearing loss
SES	Socio-economic status
dBA	A-weighted decibels
dBC	C-weighted peak sound pressure levels
WHO	World Health Organisation
PMP	Personal/portable music player
OHS	Occupational Health and Safety
NIOSH	National Institute of Occupational Health and Safety
AVE	Average
EST	Estimate
LAEQ	A-weighted equivalent sound level describing the sound level with the same energy content as the varying acoustic signal measured
LEX	The 8-hour Laeq (daily exposure sound pressure level)
LAE	A-weighting sound exposure level
LCpeak	C-weighted peak sound level

ABSTRACT

TITLE:	The risk perceptions of young people to amplified music at concerts and festivals in South Africa
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Recreational noise exposure has tripled in the last three decades. A major source of this noise is amplified music. Exposure to amplified music can result in similar auditory damage to that caused by other loud noises. Damage to the inner ear leads to elevations of hearing thresholds, characteristically a loss in higher frequencies. An acquired hearing loss due to amplified music can be referred to as a recreational noise-induced hearing loss.

Prevention of recreational hearing loss begins with improving awareness about the risk of amplified music. In order to assess the risk perceptions of young people attending music events, a descriptive design involving a quantitative risk-perception survey was conducted at five music events. Dosimetry measurements were performed in order to describe the sound pressure levels.

This investigation provided information regarding the influence of demographics on the perception of risk. It was suggested that women, older age groups, and those from a higher socio-economic status (SES) are more likely to identify themselves as more susceptible to auditory-specific symptoms. The demographics of the population that showed greater propensity for risk was males, those aged 18 to 20 years, those in Matric, homemakers and individuals from a lower income group. These individuals may perceive themselves as invulnerable to negative consequences. Furthermore, majority of those who attend music events have never used earplugs; with only a third of them willing to make use of hearing protection if it were stipulated by law.

Concern about one's own hearing and awareness of other auditory symptoms could be associated with greater compliance to hearing protection. In order to promote healthy hearing behaviour among young people, it is crucial to account for differences in risk perceptions. The findings in this investigation are valuable in terms of the development of recreational hearing health risk preventative strategies.

Keywords: *noise-induced hearing loss, recreational, risk perceptions, gender, age, education, socio-economic status, hearing protection*

CHAPTER ONE

INTRODUCTION AND ORIENTATION

1.1. Introduction

Noise-induced hearing loss (NIHL) due to occupational noise exposure is a well-known fact that has been well documented in literature (Keppler, Vinck & Dhooge, 2010). However, the effects of noise on the auditory system continue to be a significant social and public health problem (Chung, Des Roches, Meunier & Eavey, 2005). Besides occupational noise exposure, non-occupational noise is a serious cause for concern. Non-occupational noise or recreational noise is more relevant to a younger population, since this noise is linked to recreational activities involving amplified music, such as that found at music concerts and festivals (Jokitulppo, Bjork & Akaan-Penttila, 1992; Keppler et al., 2010).

Recreational noise exposure has tripled in the last thirty years, which is in contrast to the decline in NIHL in the occupational setting (Sliwinska-Kowalska & Davis, 2012). Moreover, if the exposure limits from occupational noise regulations are followed, amplified music at leisure time or recreational music events are associated with the risk of hearing loss in young people.

Prior to the 1960's, little was known regarding this risk and the effect of music exposure or recreational noise on the auditory system (Palin, 1994). However, later studies have since demonstrated evidence of potential risk of hearing damage from music exposure at discotheques and rock concerts (Serra, Biassoni, Richter, Minoldo, Franco, Abraham, Carignani, Joekes and Yacci, 2005; Sahdra, Jackson, Ryder & Brown, 2005; Meyer-Bisch, 1996; Fligor & Cox, 2004; Williams, Beach, & Gilliver, 2010). In addition, it has recently been accepted that loud music is one of the main recreational noise sources and acquired hearing loss due to loud music exposure has been referred to as "music-induced hearing loss (MIHL)" (Morata, 2007: p. 111).

1.2. The effect of noise on the auditory system

Excessive exposure to loud noise leads to permanent damage within the Organ of Corti (OC) structures. This leads to an elevation of hearing thresholds in different ways, depending on the type of noise exposure (Clark & Bohne, 1999). The first form of mechanical damage is classed as an acoustic trauma. This is when short duration exposures of high intensity noise (>140dBC) cause a large vibration and the OC can become detached from the basilar membrane, which leads to immediate permanent hearing damage (McBride & Williams, 2001).

The second way in which noise can cause hearing loss is through exposure to noise at relatively loud levels (85dBA or higher) over a prolonged period, similar to the levels of amplified music at concerts and festivals. Lastly, infrequent exposure to loud music may also cause temporary threshold shifts (TTS) in which an increase in the hearing threshold occurs. The rate of TTS recovery varies between different individuals, from as little as several minutes up to several days (McBride & Williams, 2001). Repeated TTS can eventually lead to permanent threshold shift (PTS) due to accumulated cellular damage. Although TTS cannot predict the degree or extent of PTS, it is a good early indicator (Girard, Leroux, Courteau, Picard, Turcotte & Richer, 2013).

The auditory damage caused by loud noise or music is due to a metabolic change within the hair cells, since excessive noise increases the shearing force and leads to cellular metabolic overload (Rabinowitz, 2000). When these hair cells are repeatedly exposed to intense sound, they become fatigued and fail to respond correctly and, although short periods of exposure to amplified sound may be experienced without permanent hearing loss, the damage from chronic exposure to high sound levels is cumulative (Chung et al., 2005). Furthermore, there is evidence that has shown that repeated exposure to noise can cause disorganisation, fusion and loss of stereocilia of the outer hair cells within the OC (Clark & Bohne, 1999). Such pathological changes will cause impaired internal amplification of the travelling wave in the cochlea (LaPage & Murray, 1998).

Moreover, the glutamate level, working as a neurotransmitter between the inner hair cells and the auditory nerve will arise when the inner hair cells are being stimulated by the high noise levels. The higher level of glutamate can become ototoxic and cause further inner hair cell damage (Moore, 1998). The affected individual may experience symptoms such as tinnitus, hyperacusis, recruitment, distortion or abnormal pitch perception (McBride & Williams, 2001; Fligor & Cox, 2004), along with elevation of hearing thresholds. Excessive music exposure can cause the same damage to the inner hair cells as that caused by occupational noise and therefore result in permanent hearing loss (Maltby, 2005). The characteristic NIHL, and similarly MIHL, is a loss of hearing sensitivity at the high frequencies, particularly 3 – 6 kHz (4 kHz) (Meyer-Bisch, 1996).

The prevention of NIHL or MIHL begins with improving awareness and increasing knowledge about the risk of loud noise and the effect of amplified music on the auditory system. According to Folmer (2006: p. 248), “when people become aware of these negative consequences, they are more willing to take steps to protect themselves against NIHL” (Folmer, 2006: p.248). As with many other health issues, educating the public before the negative consequence or problem occurs is a better solution than trying to reverse it or treat it later.

Currently, NIHL has a low level of awareness priority among adolescents internationally (Chung et al., 2005). Young people may expose themselves to harmfully loud noise with minimal awareness of the negative consequences. It has been suggested that up to 17% of American teens may have decreased hearing sensitivity due to noise exposure and they are unaware of it (Rawool & Colligon-Wayne, 2008). Chronic exposure to hazardous noise such as loud music may gradually cause permanent damage to the auditory system (Henderson, Testa & Hartnick, 2011). However, it is important to consider the risk-taking behaviour of young people in a particular context, as the behaviour of the individual will determine the dosage of exposure. Risk-taking behaviours are under the influence of social norms and values which may be further influenced by different variables such as gender norms and expectations (Bohlin, Sorbring, Widen & Erlandsson, 2011).

Previous research has shown that hearing conservation or awareness programmes aimed at young people to improve their knowledge about the dangers of noise or loud music result in a positive impact on behaviour (Chung et al., 2005; Sliwinska-Kowalska & Davis, 2012). Nonetheless, it is important to evaluate levels of awareness and risk perceptions of young people towards effective hearing loss preventative measures, in terms of hearing awareness campaigns and hearing protection at live music events. In addition, it is imperative to provide epidemiological data for the development of damage risk criteria and justification for new legislation towards the prevention of excessive recreational noise at music events in South Africa.

1.3. Statement and rationale

The incidence of recreational hearing loss continues to grow (Sliwinska-Kowalska & Davis, 2012), despite the fact that it is a potentially disabling condition that is completely preventable (Folmer, Griest & Martin, 2002). Consequently, the formulation of the research question was instigated by the identification of a need to take steps towards determining guidelines for recreational noise management, based on contextually relevant and empirical evidence in South Africa.

The purpose of this study is to provide further insight into the awareness and risk perception of young South Africans towards amplified music, specifically at music concerts and festivals, in order to initiate the development of preventative strategies aimed at minimising the risk of recreational hearing loss amongst young South Africans.

This research is valuable, since it may contribute to the provision of contextually-relevant information regarding recreational hearing loss, which is lacking in most developing countries (WHO, 1997). It aims to increase awareness of recreational hearing loss, assist in the development of effective intervention methods in terms of hearing awareness campaigns, and to provide justification for new legislation towards the prevention of excessive recreational noise and NIHL in a younger population.

For the purpose of this research project, the risk perception of young people to amplified music at music concerts and festivals across South Africa was investigated.

1.4. Chapter delineation

Chapter 1: This chapter provides the introduction, context and motivation for the research project, culminating in the research question. This is followed by an outline of the chapters and the definitions of the terminology used.

Chapter 2: This chapter provides a critical review of recreational hearing loss, attitudes towards hearing protection strategies and the risk perception of young people towards amplified music in terms of existing theoretical knowledge. The South African context and methods for prevention of recreational hearing loss are explored and this is followed by a summary and conclusion of the literature review.

Chapter 3: This chapter begins with the delineation of the main and sub-aims formulated, in order to answer the research question stated in Chapter 1. The research methodology is then described with reference to the design, the participants' selection criteria, data collection and the data analysis procedures which were applied in order to generate the results to each sub-aim and ultimately the main aim of the research project.

Chapter 4: This chapter presents the results of the statistical analysis of the data collected from the risk perception survey. The results are stated in terms of the aims set out in the research methodology.

Chapter 5: This chapter discusses and evaluates the results by drawing on and integrating previous research. This discussion is realised within the framework of the independent variables in the risk perception survey used to obtain the results: gender, age, education, employment and income status.

Chapter 6: This chapter clarifies the conclusions drawn from the results, with reference to the definitions of clinical effectiveness and efficiency. The clinical implications of the research were examined and recommendations for future research were identified through a critical review of the research project.

1.5. Definition of terms

Damage risk criteria

Damage risk criteria is a means of describing how many people would be at risk for sustaining a material hearing impairment, given certain sound exposure, and taking into consideration not only sound intensity, but also sound duration (Fligor & Cox, 2004).

Decibel

The decibel is the unit of intensity of sound - the measurement of loudness. This unit is used to express relative differences in power or electric signals equal to ten times the common logarithm of the ratio of two levels (The American Heritage Dictionary of the English Language, 2000): one tenth of a bel. It is the unit for expressing the relative intensity of sound on a logarithmic scale (Farlex Partner Medical Dictionary, 2012).

Hearing loss

An inability to perceive the normal range of sounds audible to an individual with normal hearing. Hearing loss may be greater at some frequencies than others, or all frequencies may be equally affected. Conductive hearing loss is a result of damage to the outer or middle ear, whereas sensorineural hearing loss results from damage to the cochlea (inner ear) or auditory nerve. The loss is measured in decibels and may be described as mild, moderate, severe or profound (Farlex Partner Medical Dictionary, 2012).

Hearing threshold

According to the Encyclopaedia of Acoustics (1997: p. 1545), hearing threshold can be defined as "the lowest sound levels (absolute hearing thresholds) that a listener can detect as well as the highest (upper limits of audibility) that a listener can tolerate". These thresholds are used to describe hearing sensitivity and the dynamic range of hearing for both normal and hearing-impaired listeners.

Hyperacusis

Hyperacusis can be defined as a heightened sensitivity to sound, with averse or pained reactions to normal environmental sounds (Farlex Partner Medical Dictionary, 2012).

Music concerts

Concerts are music performances given by one or more singers, instrumentalists, or both (The American Heritage Dictionary of the English Language, 2000).

Music festivals

A music festival is an occasion for feasting or celebrating, especially a day or time of religious significance that recurs at regular intervals. It is often a regularly-recurring programme of cultural performances, exhibitions or competitions commonly held outdoors (The American Heritage Dictionary of the English Language, 2000).

Music-induced hearing loss

Music-induced hearing loss (MIHL) is an acquired hearing loss as a result of loud music exposure. This term remains a controversial topic. While some studies have shown that the risk of hearing loss increases as music exposure increases, further research is still needed (Morata, 2007).

Noise-induced hearing loss

Clinically, noise-induced hearing loss (NIHL) is a permanent form of hearing loss that occurs because of exposure to intense sound. After a single exposure, there are initial temporary changes in hearing that are reversible, but if the sound is intense enough or repeated, permanent irreversible hearing loss occurs, which is referred to as a permanent threshold shift (PTS). In short, noise-induced hearing loss is the deafness that occurs when the ears are exposed to sounds in excess of what they can handle (Dobie, 2001).

Occupational noise

Occupational means relating to a person's job or profession (Collins Cobuild English Dictionary for advanced Learners, 2003), therefore this term relates to industrial noise that is hazardous to worker safety and health in places of employment.

Permanent threshold shift

Long-term auditory fatigue results in a permanent threshold shift (PTS); this can be explained as permanent loss of hearing after exposure to sound. The Farlex Medical Dictionary (2012) defines PTS as an irreversible hearing loss that results from exposure to intense impulse or a continuous sound, as opposed to the reversible TTS that also results from such exposure.

Personal music player

A portable media player (PMP) is a personal mobile device that allows the user to listen to recorded audio while mobile. Sometimes a distinction is made between *portable players* which are battery-powered and with one or more small loudspeakers, and *personal players* which are listened to with earphones (Collins Cobuild English Dictionary for Advanced Learners, 2003).

Recreational

Activities of leisure that are often undertaken for enjoyment or amusement and are considered to be "fun" can be called recreational. According to Farlex Medical Dictionary (2012), the term encompasses all that is done as recreation, including pastimes, amateur activities or any non-professional activities.

Socio-economic status

Socio-economic status (SES) is an economic and sociological combined total measure of a person's work experience and of an individual’s or family’s economic and social position in relation to others, based on income, education and occupation. It relates to a position in a social hierarchy relative to the society of the individual (Farlex Medical Dictionary, 2012).

Sound pressure level

Sound pressure level (SPL) is a logarithmic measure of the effective sound pressure of a sound relative to a reference value. It is measured in decibels (dB) above a standard reference level. The human ear is not equally sensitive to sounds at different frequencies. To account for the perceived loudness of a sound, a spectral sensitivity factor is used to weight the sound pressure level at different frequencies (A-filter). These A-weighted sound pressure levels are expressed in units of dBA (WHO, 2004).

Temporary threshold shift

Short-term auditory fatigue may result in temporary threshold shifts (TTS). This refers to the reversible hearing loss that results from exposure to intense impulse or continuous sound, as opposed to the irreversible permanent threshold shift (PTS) that may result from such exposure. Full recovery from TTS can be achieved in approximately a few minutes up to several days. TTS is relatively independent of exposure duration and it is maximal at the exposure frequency of the sound (Farlex Medical Dictionary, 2012).

Tinnitus

Tinnitus is a pathological sound in one or both ears, such as a ringing, roaring, whistling or buzzing occurring without the presence of an external stimulus. It is often associated with many forms of hearing loss and noise exposure and can be related to specific conditions, including blocked auditory canal, ear infections, reaction to certain ototoxic drugs or a head injury (The American Heritage Dictionary of the English Language, 2000).

Vuvuzela

The vuvuzela is a unique African horn blown at sporting events by avid supporters. Also known as *lepatata mambu* (its Tswana name), it is blown to make a loud noise similar to that of a trumpeting elephant (Collins Cobuild English Dictionary for Advanced Learners, 2003). It is a plastic horn, about 65cm long which produces a monotone note, typically around B♭ 3 (the B♭ below middle C). There are many types of vuvuzelas, made by several manufacturers that produce various intensity and frequency outputs. The intensity of these outputs depends on the blowing technique and pressure exerted (Swanepoel, Hall & Koekemoer, 2010).

1.6. Summary

It is well known that excessive exposure to loud noise can cause irreversible and debilitating damage to the auditory system (Girard et al., 2013). Excessive exposure to amplified music results in the same damage in the inner hair cells as that caused by occupational noise, resulting in permanent hearing loss (Sahdra, Jackson, Ryder & Brown, 2002). The prevalence of these effects on the auditory system has been increasing in a younger population, despite the fact that NIHL due to occupational noise has decreased over the last 10-15 years (WHO, 1997).

Thus, it is imperative that contextually-relevant and empirical research be conducted to obtain the necessary data to establish guidelines for preventative measures against this damage to the auditory system of young people. The rise of recreational hearing loss due to amplified music needs to be addressed through identification of the attitudes and risk perceptions of younger people involved in these noisy recreational activities. The risk perception of young people who socialise in settings where there is excessive exposure to amplified music, such as music concerts and festivals, needs to be identified and evaluated in order to determine the most effective and applicable hearing-protection strategies relevant for this specific young South African population.

CHAPTER TWO

RECREATIONAL NOISE AND RISK PERCEPTION: A CRITICAL REVIEW

2.1. Introduction

The risk of noise-induced hearing loss (NIHL) from loud noise, occupational or recreational, is dependent on three main variables, namely: the sound intensity, the sound duration and genetic vulnerability (Sahdra et al., 2002). When considering the two sound-related variables - namely, sound intensity and sound duration - evidence has shown that prolonged exposure to high intensity noise will cause noise injury in the form of damage to the auditory system over time (WHO, 1980; Clark, 1991; Henderson et al. 2011). However, historically the effects of the intensity and duration of loud noise on hearing have not been widely recognised as a problem among the younger population. It has only been widely recognised as an occupational hazard among the working, older population (Niskar, Kieszak, Holmes, Esteban, Rubin & Brody, 2001).

It has been well established that environmental noise is an occupational hazard among adults. Therefore, there are numerous conservation programmes available, including public health interventions such as legislation and occupational regulations, education and awareness campaigns, as well as numerous occupational health and safety initiatives which include annual hearing screening protocols for adults in the occupational setting. However, safety standards regarding recreational noise have not been widely implemented or accepted (Chung et al., 2005).

In addition, there is minimal awareness among the public regarding the number of non-occupational activities that may be sources of hazardous environmental noise (Niskar et al., 2001), such as attendance at live music events, including music concerts and festivals. Furthermore, adolescent NIHL in particular remains misunderstood (Shargorodsky, Curhan, Curhan & Eavey, 2010), despite the fact that this recreational noise poses similar risks to the structures of the auditory system and this may result in important educational and social implications (Serra et al., 2005; Sahdra et al., 2005; Meyer-Bisch, 1996; Fligor & Cox, 2004; Williams et al., 2010).

An interdisciplinary long-term study by Serra et al. (2005) investigated the effects of recreational noise exposure on the hearing of adolescents. Audiological, psychosocial and sound measurements were performed annually to determine the hearing threshold level (HTL) of boys and girls (aged 14-17 years) in the 250-16 000 Hz range; their participation in recreational activities; and sound levels at discotheques and through personal music player (PMP) use. The results of this study indicate an annual increase in participation in activities involving music, as well as an elevation of mean hearing thresholds at high frequencies (Serra et al., 2005), as is characteristic of NIHL.

Similarly, Meyer-Bisch (1996) reported in an earlier study that there was a significant reduction in hearing thresholds in participants attending concerts at least once a month, as compared to a control group. The term 'music-induced hearing loss' (MIHL) is now used for a condition like NIHL, as both are characterised by the same high frequency notch on the audiogram (around 4 kHz) and both are linked to the intensity and duration of exposure.

However, the term "MIHL" remains controversial, since noise is defined as an unwanted sound, while music, although it may be excessively loud at times, is quite the opposite (Morata, 2007: p. 111). Therefore, the difficulty in managing recreational hearing loss is that the noise source viewed as dangerous by hearing health care professionals is the same source viewed as pleasurable by participants. Moreover, these recreational activities have the added influence of peers and social settings (Gilliver, Carter, Macoun, Rosen & Williams, 2012).

2.2. Prevalence

Since the early 1980s the prevalence of recreational noise exposure has tripled from 6.7% to 18.8% (Smith, Davis, Ferguson & Lutman, 2000). In Great Britain alone, it has been estimated by the Medical Research Council that > 4 000 000 adolescents suffer from hearing loss due to listening to amplified music (Institute of Hearing Research, 1986). More recent data from the United Kingdom indicates that 20% of young people regularly expose themselves to excessive levels of loud music (Henderson et al., 2011).

Similarly increased prevalence rates of NIHL in younger people were found in the United States of America. The third National Health and Nutrition Examination Survey (NHANES) demonstrated that during 1988-1994, 12.5 % of young people had evidence of NIHL (Niskar et al., 2001). Later research was conducted that stated that among American adolescents, the prevalence of hearing loss has significantly increased from 12.5 % in 1988-1994 to 19, 5% in 2005-2006 (Shargorodsky et al., 2010). In addition, the prevalence of NIHL in female youths had also increased to statistically-significant levels compared to twenty years prior (Henderson et al., 2011).

This continued escalation may be due to the fact that in the past 20 years the power of amplification that is affordable has steadily grown (Zhao, Manchaiah, French & Price, 2010). In addition, the phenomenon of young people listening to music in almost every environment - described by Plath (1998) as the “fear of silence’’ - can also be seen as a contributing factor (Keppler et al., 2010).

According to Folmer (2006: p. 248), “young people are often exposed to hazardous levels of loud sound”, an example of which is amplified music at concerts. Young people attend concerts where they are exposed to sound levels above 100dBA (Clark, 1992). Similarly, Opperman, Reifman, Schlauch & Levine (2006) recorded sound levels of 126dBA for pop music, 113dBA for heavy metal and 118dBA for rock concerts. According to Chung et al. (2005), it is possible for music at pop concerts to reach levels from 120dBA up to an extreme 140dBA. Attendance at discotheques is another popular recreational activity among young people and, according to Serra et al. (2005), the mean sound levels may range from 104 - 112dBA. These levels may not be as excessive as the amplified music at concerts, although both of these recreational activities may put the auditory system at risk for damage, relative to the duration of exposure.

If we apply the principle that a 3dB increase in sound level can be offset by halving the permissible exposure duration (NIOSH, 1998), the maximum exposure times for sound level range in a discotheque range from 5 minutes at 112dBA to 30 minutes at 104dBA (Vogel, van der Ploeg, Brug & Raat, 2009: p. 531) If the sound exposure limits for International Occupational Health and Safety regulations, which state that prolonged exposure to equivalent levels more than and equal to 85dBA during 40 hours per week are applied (NIOSH, 1998), amplified music at these recreational activities (discotheques and music concerts) is most certainly associated with the risk of hearing loss in this younger population (Sliwinska-Kowalska & Davis, 2012). This corresponds to the increased prevalence of recreational NIHL or MIHL evident in the literature review (Smith et al., 2000; Zhao et al., 2010; Keppler et al., 2010).

2.3. Attitudes towards hearing protection

Empirical research suggests that the use of hearing protection will promote prevention of hearing damage at high frequencies, as is seen in NIHL. However, the use of earplugs may be affected by several factors including social norms, attitudes and risk perception. A contemporary study by Landalv, Malmström and Widen (2013) states that individuals holding the belief that one should wear hearing protection when being exposed to loud music have less tolerant attitudes towards loud music. Similarly, the reverse is true: adolescents with a positive attitude towards noisy environments are less inclined to use any hearing protection at concerts and discotheques, compared to those who are of the opinion that loud music may be problematic (Olsen-Widén & Erlandsson, 2004).

Opperman et al. (2006) reported a significant reduction in TTS when rock concert attendees used ear protection (27%). Conversely, there was a high percentage of participants without earplugs who showed a significant TTS (64%). Results from a web-based survey conducted by Chung et al. (2005) reported that 14% of young people who attended concerts were compliant with the use of hearing protection. This was similar to findings by Bogoch, House and Kudla (2005) that reported that 80.2% of participants were non-compliant with hearing protection use when attending concerts. However, 66% of participants reported that they "would consider wearing hearing protection if they were aware of the risks involved" (Chung et al., 2005: p. 865).

Moreover, adolescents' use of hearing protection is associated with factors relating to lifestyle, such as socio-economic status (SES) (Keppler et al., 2010). Adolescents with higher SES reported more negativity towards noise and made use of hearing protection more often than those from a lower SES background (Olsen-Widen & Erlandsson, 2004). According to Van Kamp and Davies (2013), some noise exposures may be worse for particular subgroups, including lower socio-economic groups. This is best supported by literature as a result of "learned helplessness and unequal distribution of noise in the population" (Van Kamp & Davies, 2013: p. 154).

Among young people, one can assume that peer group norms are providing some guidance with regard to the willingness to wear hearing protection in recreational noise situations. Regardless of SES, peer pressure, culture or background, music plays an important role in adolescents' social development and in the development of "peer-group identification" (Strasburger & Donnerstein, 1999: p. 129). Simultaneously, loud music can constitute a significant risk for an individual's hearing in this modern day of improved methods of music amplification.

2.4. Risk perception of amplified music

Research related to risk perception regarding recreational noise has shown that, although young people perceive music concerts and festivals as the loudest recreational activity at which a conversation must be "shouted at over a distance" (Keppler, Dhooge, Maes, D'haenens, Bockstael, Philips, Swinnen & Vinck, 2009: p. 151), the majority are not aware of the risks associated with this exposure to loud recreational noise (Folmer, Saunders, Dann, Griest, Leek & Fausti, 2010). Bohlin and Erlandsson (2007) have concluded that young people do not consider loud recreational noise, such as that found at concerts, to be as great a risk as traditionally-risky situations, such as drugs or speeding. This is consistent with the fact that there is a significant amount of misconception regarding the risk of recreational noise exposure and its effects (Bohlin & Erlandsson, 2007; Weichbold & Zorowka, 2003).

Certain people tend to take more risks than others, which may be as a result of personality traits (Widen, Holmes, Johnson, Bohlin & Erlandsson, 2009) rather than misconceptions. Previous studies have shown that young women judge risk situations as more dangerous than young men, providing evidence that gender plays a role in risk perception (Bohlin & Erlandsson, 2007). However, women tend to behave in similar ways to men, despite having a greater perception of how much risk is present. This may be due to social and culturally-based phenomena (Bohlin & Erlandsson, 2007), including the influence of the behaviours of one's peers (Gilliver et al., 2012). According to Irwin (1990), risk-taking behaviour is determined by an interaction of multiple factors, including individual risk perceptions, individual values, peer group characteristics, age and, more specifically, maturation. The start of risky behaviour at a younger age may be associated with exposure to more frequent risks, as well as the adoption of different kinds of risky activities (Irwin, 1990; Widen & Erlandsson, 2007).

As previously stated, individuals who are aware of the risk of damage to the auditory system due to loud noise exposure tend to hold less tolerant attitudes towards loud noise. In theory, this would increase the probability of the use of hearing protection devices or other preventative measures (Landalv et al., 2013). However, the fact that there are proportionally more people aware of the risks of noise exposure than the number of people who make use of hearing protection, it can be concluded that it requires more than awareness regarding risk to change people's behaviour (Chung et al., 2005; Bogoch et al., 2005).

Research has also shown that young people "neither demand nor require" the excessive sound levels present at live music events (Mercier & Hohmann, 2002: p. 55). Keppler et al. (2009), deduced that a more positive perception regarding noise exposure leads to increased hearing damage, while more negative or neutral attitudes prevent hearing deterioration. Similarly, it was reported that hearing threshold levels worsened with positive evaluation of barriers to preventative measures (Widen et al., 2009).

In a study concerning the perception of excessive sound levels by Mercier and Hohmann (2002), 35% of participants considered concerts to be too loud, 71% reported that they had suffered tinnitus and fewer than 5% expressed a preference for higher sound levels. The overall number of teenagers and young adults who have experienced transient tinnitus as a result of recreational activities such as concerts ranges between 20% and 80% (Widen & Erlandsson, 2004; Degeest, Corthals, Vinck & Keppler, 2014). It has been stated that young people suffering from hearing symptoms such as tinnitus judged "listening to loud music as more risky than those with no symptoms" (Bohlin & Erlandsson, 2007: p. 62).

In addition, individuals reporting tinnitus and noise sensitivity are more concerned about hearing loss than those without symptoms and are generally more compliant with hearing protection (Widen et al., 2009). It is critical to determine how excessive sound pressure levels in recreational situations are perceived by the people attending these music events, in order to assess the awareness about the excessive levels at music concerts and festivals. Widen et al. (2009) stated that individual attitudes toward noise are affected by one's own experiences, which may influence how an individual chooses to act in the noisy situation.

Furthermore, misperceptions of social norms relating to listening behaviour may decrease an individual's perceptions of hearing damage. Currently, social factors such as social norms have generally received little attention in hearing health care research. Thus, it is important to investigate perceived social norms in relation to individual risk perception regarding recreational noise (Gilliver et al., 2012).

Although there is an increasing body of research aimed at the risk-taking behaviour in loud noise situations, there remains an increased need for determining new prospective variables to be included, in order to work on preventative behaviour strategies (Landalv et al., 2013) that are culturally and contextually relevant and successful.

2.5. Recreational noise in the South African context

There is no doubt that exposure to loud noise constitutes a significant risk to one's hearing (Widen & Erlandsson, 2007), yet amplified music levels in recreational environments far exceed occupational noise exposure limits (Zhao et al., 2010). In order to address the lack of comprehensive regulations regarding excessive recreational noise levels, in 1997 the World Health Organisation (WHO) published a document concerning probable increased risks of future hearing damage due to noise exposure, particularly in young people (WHO, 1997).

Whilst there is literature available which explores music-induced hearing loss (MIHL) primarily in professional musicians and employees working in these environments (Sahdra et al., 2002), as well as substantial evidence showing increased risk to the general public (Serra et al., 2005; Morata, 2007), no research has been undertaken to investigate risk perception relating to excessive sound pressure levels at live music events in the South African context.

A solitary South African study related to recreational noise and its effects on hearing was conducted by Swanepoel, Hall and Koekemoer (2010) which investigated the sound pressure levels of vuvuzelas, a unique African horn blown at sporting events by avid supporters. This study concluded that the vuvuzela exceeds the permissible occupational noise exposure levels in South Africa and poses a significant recreational risk of NIHL. This research provided evidence that there is a need for preventative measures such as public awareness and hearing protection in cases of recreational noise. Furthermore, it stated that preventative measures should be prioritised as an important health care approach in South Africa and, in this particular case, NIHL at sporting events where the vuvuzela is used, namely football matches (Swanepoel et al., 2010).

Access to amplified noise or music through various different sources including vuvuzelas, toys, arcade games and personal music players has also become easier (Zhao et al., 2010). According to Keppler et al. (2010: p. 11), “the number one top source of leisure noise relating to amplified music is personal music player (PMP) usage”. However, certain constraints have limited the use and popularity of PMP’s in South Africa in comparison to other First World countries. Although the market for PMP’s in South Africa is growing, the main obstacle apart from affordability remains the availability and access to bandwidth, affecting the downloading of music. Only 40 000 of a population of over 40 million have access to a broadband connection, and downloading over a leased line and, even worse, a dial-up connection, takes a considerable amount of time. Furthermore, only 7 500 are connected to the internet in their homes. (Balancing Act, Issue no. 240).

Those with access via business lines would not be permitted to make use of them for this recreational activity. A representative for a well-known PMP manufacturer, Rutger van Spaandonk, stated that the rural communities in South Africa do not have access to computers or the internet and therefore rely on listening to cassettes (Balancing Act, Issue 240). Due to income disparity, the majority of South Africans purchasing popular PMP’s were from a middle- and upper-class background. Thus, there is still a gap between the PMP usage of young South Africans in comparison to the youth in Europe and in the USA (Balancing Act, Issue no. 240).

Although PMP's may not be as readily accessible in South Africa, improvements in technology and amplifying equipment is, and this allows sound to be presented at higher levels without distortion. Music is present in almost every social situation: discotheques, night clubs, music concerts and festivals. This is of greater concern today, owing to the advancements in amplification and the excessive intensities at which adolescents immerse themselves in this music.

International concerts reach maximum levels greater than 100dBA, which exceed international standards (Clark & Bohne, 1986; Clark, 1991; Smith et al., 2000; Opperman et al., 2006). These international guidelines have been adopted by the South African Occupational Health and Safety Act. In South Africa, the Occupational Health and Safety (OHS) Act No. 85 states that 'No person shall be required or permitted to be exposed to noise at or above 85dBA noise-rating limit' for the duration of eight hours in any workplace (OHS Amended Act, 1993: p.2). Similarly, according to the South African National Institute for Occupational Safety and Health (NIOSH) criteria for occupational noise exposure (1998), the recommended limit is 85dBA as an 8-hour time-weighted average (NIOSH, 1998). Currently, there is no recreational noise-specific damage risk criterion in South Africa for exposure to noise at events such as music concerts or festivals.

As stated by the World Health Organisation's report on Prevention of Noise-Induced Hearing Loss (1997), there is a serious shortage of accurate epidemiological information relating to recreational NIHL, which includes amplified music at concerts and festivals, especially in developing countries such as South Africa (WHO, 1997). Further studies are needed to investigate the increased prevalence of recreational NIHL and to identify potential modifiable risk factors for prevention (Shargorodsky et al., 2010).

2.6. Prevention of recreational hearing loss

Although recreational noise has been on the rise, occupational noise has declined, which may be as a result of extensive public health awareness campaigns and strict standards for hearing protection in the occupational setting (Sliwinska-Kowalska & Davis, 2012). Concern over the escalation in recreational noise levels (Smith et al., 2000; Sliwinska-Kowalska & Davis, 2012) has recently led to an increased focus on the provision of hearing health care information and other public health interventions in recreational environments (Gilliver et al., 2012).

Public health interventions may include education and training, audiometric testing, noise exposure assessment, hearing protection options and implementation of measures for excessive noise control. When feasible, these intervention strategies are all components of occupational hearing conservation that can be adapted to a younger population and recreational noise exposure (Niskar et al., 2001).

According to Fligor and Cox (2004), education and motivation are two of the most significant predictors for prevention of NIHL. However, they are the two most difficult to put into place, especially among younger people (Fligor & Cox, 2004). Theoretically, hearing protection devices can be applied for avoidance of high sound pressure levels, in order to minimise the risk for NIHL or MIHL in young people. However, in reality it may be more effective to make use of environmental interventions rather than to change individual behaviour (Vogel et al., 2007).

In a study by Bogoch et al. (2005), it was found that fewer than 20% of participants made use of hearing protection and only 3% always made use of hearing protection at rock concerts. The conclusion was that those with previous hearing difficulties were more willing to use hearing protection with an odds ratio of 3.29. This suggests that through personal experience of the harmful effects of noise at concerts or music events, there is improved compliance with preventative measures (Bogoch et al., 2005).

Lack of experience or knowledge regarding hearing-related symptoms is not the only influential factor on willingness to make use of earplugs. Cosmetics, comfort and sound quality all play a role. Until recently, the only hearing protector devices made widely available were those for industrial purposes. These earplugs tend to attenuate higher frequencies more than lower frequencies, thereby distorting the perceived spectrum of timbre of sound, which is important when listening to music. In addition, they produce an occlusion effect - an enhancement of the low frequency spectrum that occurs when the ear canal is blocked. However, there are earplug types that provide flat attenuation across the frequency range that have less impact on the sound quality of the music. These types are generally custom-made for musicians and can be more costly (Bogoch et al., 2005).

Compliance with hearing protection use is an important factor in reducing auditory problems caused by noise, as well as a change in lifestyle and limiting environmental noise exposures (Toppila, Koskinen, Savolainen, Paakkonen, Airo, Olkinuora, et al., 2011), such as the amplified music exposure experienced at music concerts and festivals. Music concerts and festivals exceed the highest recommended sound pressure levels and, according to Ryberg (2009: p. 127), 42% of these music events are "dangerously loud". Attendance at these events cannot be changed, as listening to music should not be discouraged. Moreover, it is a vital part of human experience and culture (Taljaard, Leishman & Eikelboom, 2013).

Thus, the focus should be on promoting healthy listening habits through awareness and education. Health education programmes provide information and improve knowledge regarding all aspects related to NIHL. Nevertheless, this does not necessarily include attitudinal or behavioural change (Weichbold & Zorowka, 2003; Keppler et al., 2009). These programmes are dependent on motivating individuals not only to monitor their own behaviour, but also to modify it as necessary (Gilliver et al., 2012).

One of the greatest challenges for health promoters and hearing health care professionals is to design health risk prevention programmes that will motivate, assist and empower young people to change their risky behaviours (Folmer et al., 2002). Therefore, population-specific risk perception research is a fundamental cornerstone in the development of successful risk prevention programmes.

When designing a hearing loss prevention programme, evidence shows that the following should be included: information about the process of hearing, varieties of hearing loss and what causes these, how noise affects hearing temporarily and permanently, detection of NIHL and preventative strategies for NIHL (Folmer et al., 2002; Vogel et al., 2007). Nevertheless, it is imperative to note that the success or failure of these programmes lies less in the information and more in the opportunities available for delivery, the methods used in delivering this information to young people and the intervention or awareness methods that can be adapted (Henderson et al., 2011; Folmer et al., 2002).

Furthermore, another critical factor contributing to an effective hearing loss prevention programme is the full administrative support from Governmental bodies, departments and every managerial level involved (Taljaard et al., 2013). The lack of bureaucratic awareness and the negative attitudes have often been reported as major factors behind the failure or sporadic implementation of health conservation programmes. Moreover, long-term evaluations are essential in the effectiveness and efficiency of such programmes (Folmer et al., 2002; Taljaard et al., 2013).

2.7. Conclusion and summary

"Sound intensity and sound duration are the two main variables related to sound that are associated with damage to the auditory system as a result of noise" (Clark, 1991: p. 175; Henderson et al., 2011: e45). Although the risk of NIHL has been well documented in the occupational setting, recreational noise and its risk on a younger population remains a cause for concern. Furthermore, there is a lack of preventative research and implementation of successful preventative strategies aimed at recreational noise management (Niskar et al., 2001), despite the fact that recreational noise continues to increase (Shargorodsky et al., 2010).

If the sound exposure limits for International Occupational Health and Safety regulations are applied (NIOSH, 1998), amplified music at recreational activities such as music concerts and festivals is most certainly associated with the risk of hearing loss in a younger population (Sliwinska-Kowalska & Davis, 2012). Additional research is necessary, not only to modify and to adapt these limits and risk-prevention strategies developed for occupational settings, but also to identify the attitudes of the specific younger population towards these preventative strategies and their risk perception towards recreational noise and recreational NIHL or MIHL.

Evidence has shown that individual and societal attitudes play a significant role in the effectiveness of, and compliance with, hearing health conservation initiatives (Olsen-Widen & Erlandsson, 2004; Landalv, et al., 2012). Therefore, identification of individual risk perception and attitudes in the South African context will provide a starting-point for the development of NIHL or MIHL preventative strategies that young people will be motivated to accept and adhere to.

Currently, there is minimal research and evidence-based practice in the field of recreational hearing loss in South Africa. Whilst access to amplified noise through various different sources has become easier and more readily available to young people, it has increased the prevalence of recreational noise exposure.

Since recreational hearing loss is a potentially debilitating condition which is almost completely preventable (Folmer et al., 2002), there is a critical need for epidemiological information relating to recreational noise in South Africa. This will provide data that will form part of the foundation that is culturally and contextually relevant for recreational hearing loss preventative measures, such as education and training, exposure assessment, hearing protection and regulation of noise limits at South African music concerts and festivals.

CHAPTER THREE

RESEARCH DESIGN AND METHOD

3.1. Introduction

Research has shown that there is an increasing trend of recreational NIHL or MIHL among young people (Chung et al., 2005). The younger population expose themselves to loud music for recreational entertainment and the level of awareness that this loud music may result in a hearing loss is currently very low amongst the young South African population.

The current study is aimed at providing quantitative data necessary to describe the sound level exposure at five music events and, in addition, to identify the risk perception of this exposure of recreational noise present at these live music events. More specifically, it is aimed at ascertaining the risk perceptions of young South African people towards amplified music, their risk perception regarding the negative consequences of amplified music on the auditory system and their willingness to adhere to preventative measures aimed at minimising the incidence of recreational NIHL.

This chapter presents the research methodology, including the objectives of the study, the research design, ethical considerations, description of the participants, materials and procedures, as well as the data coding and analysis.

3.2. Objectives of the study

The main objective of this study was to determine the risk perception of young people to amplified music at concerts and festivals in South Africa.

The secondary research objectives subsequently identified were:

1) To determine general perceptions regarding the exposure and level of amplified music at music events.

2) To determine the risk perception regarding the exposure to amplified music on the auditory system.

3) To determine the willingness of young people to comply with hearing risk preventative strategies.

3.3. Research design

According to Mouton (2001), the research design is a plan or a blueprint of how one intends to conduct the research. A descriptive risk-perception survey was conducted at music concerts and festivals across South Africa in order to make specific predictors or to discover relations and interactions amongst variables. Research participants who formed part of this population were young South African adults attending the music concerts or festivals.

The required data were collected via direct questionnaires at the entrance to these events by the researcher and three data collectors. This systematic descriptive technique enabled the present study to employ multiple statistical measures. Struwig and Stead (2003) delineate the statistical method as a descriptive research design. This design was used in order to examine a few variables in a large number of participants.

One of the distinguishing characteristics of this quantitative research is the fact that it was a formal, objective, systematic process in which numerical data were used to obtain information (Struwig & Stead, 2001). This quantitative research made use of dosimetry measurements to describe the excessive levels of recreational noise at the music concerts and festivals. Furthermore, the primary data from the questionnaires were used to describe variables relating to risk perception about this excessive recreational noise and to determine cause-and-effect interactions between these variables (Burns & Grove, 2005). This quantitative research involved gathering numerical measures that were subjected to statistical analysis, with the aim of confirming or validating the theory, as well as predicting and explaining the specific phenomenon stated in the research question (Leedy & Ormrod, 2005).

3.4. Ethical considerations

The ultimate goal of all scientific research is the search for the truth. The "epistemic imperative" refers to the moral commitment that scientists require to make the search for truth and knowledge (Mouton, 2001: p. 239). More simply, research ethics offer a code of moral guidelines, which help the researcher carry out a study in a morally acceptable way (Struwig & Stead, 2003).

It was necessary for the researcher to obtain ethical clearance from the ethical committee of the institution she represented, prior to commencing the study (Mouton, 2001; Leedy & Ormrod, 2005). Ethical clearance, compliant with the regulations of the Research and Ethics Committee of the Faculty of Humanities, was obtained prior to commencing the study (Appendix A).

During this study, all participants asked to complete a questionnaire were read a letter of informed consent (Appendix B) prior to completing a questionnaire (Appendices C & D), which stated that by completing and returning the questionnaire, responding participants gave informed consent to the researcher to use the data collected for research purposes. The ethical principles that were applied throughout the planning and completion of this study were as follows:

- Objectivity and integrity

Research ethics require researchers to be competent in both the subject matter and in research methodology. The researcher maintained objectivity and integrity throughout the research process (Mouton, 2001). Furthermore, the researcher became familiar with the research methodology and acquired the necessary theoretical knowledge in the area of leisure noise, with particular reference to amplified music levels at music concerts and festivals. The researcher adhered to the highest possible technical standards. All limitations in the study are stated at the conclusion of the research and all of the results have been represented in a just and accurate manner without any misrepresentations (Kimmel, 1988).

- Respect for others and reporting of information

The most important principle that guides the relationship between science and the rest of society is that of accountability (Mouton, 2001). Therefore, participants' informed consent was obtained and confidentiality was ensured in order to achieve respectful research (Singer, 1993). Only participants between the ages of 18-30 years, who participated voluntarily and from which informed consent was obtained, were included in the study. Concert and festival organisers were informed about the intent of the research, explaining that questionnaires would be distributed outside these events. Confidentiality was maintained at all times and the personal details of the participants, as well as those of the concerts and festivals, were not be made available (Singer, 1993). All research information, in terms of the methodology, techniques of analysis and findings, were reported and made readily available to other researchers in a complete and consistent fashion (with appropriate references) (Mouton, 2001; Babbie, 1998).

- Beneficence and non-maleficence

Competence on the part of the researcher and the development of an appropriate research design are required for an ethically-acceptable study (Leedy & Ormrod, 2005). The results of the study were shared in order to further the academic instruction (Kimmel, 1988), and to provide information pertaining to the topic of excessive leisure noise and recreational hearing loss in the South African context. Researchers are held responsible for their research and consequently have an obligation towards society to conduct research in a socially-acceptable and responsible fashion (Mouton, 2001; Babbie, 1998). Research results were readily made available to other researchers and society within the limits of maintaining confidentiality of responding participants and institutions involved (Mouton, 2001; Babbie, 1998).

- Honesty

Research findings were reported in a comprehensive and truly representational way, without the inclusion of any findings that might mislead or misinform others (Leedy & Ormrod, 2005). Honesty was maintained and plagiarism eliminated by ensuring that all individuals that contributed, as well as all references that were consulted directly or indirectly during the execution of this study, were acknowledged (Mouton, 2001; Babbie, 1998).

- Confidentiality

The participants have a right to remain anonymous. This right was respected consistently (Kimmel, 1988). Confidentiality of the respondents was maintained throughout the study and each respondent and event was provided with a numerical value when results were recorded. The names of the respondents and the events were not made available to other parties and have been excluded from the study (Struwig & Stead, 2003). When the gathering of research information is based on mutual trust, it is of the utmost importance that participants' rights, interests and sensitivity are protected (Mouton, 2001). Therefore, participants' rights to privacy were taken into account by informing them that they had the right to refuse to answer the questions in the questionnaire and therefore to reject participation in the study (Mouton, 2001, Babbie, 1998).

- Informed consent

Informed consent is a crucial ethical consideration (Mouton, 2001; Leedy & Ormrod, 2005). Subsequently, a covering letter of informed consent (Appendix B) explaining the rationale, aim, possible benefits of participating in the study, who would benefit from the study, as well as expected results following completion of the study, was presented along with the questionnaire

(Appendices C & D) (Mouton, 2001; Leedy & Ormrod, 2005). The covering letter also informed potential participants that participation was completely voluntary, that he/she could withdraw from the study at any time, that all information remained confidential and that data would be stored for archiving purposes for a fifteen-year period at the University of Pretoria (Leedy & Ormrod, 2005; Mouton, 2001).

3.5. Research participants and music events

3.5.1. Questionnaire participants

Questionnaire participants were selected through the implementation of quota sampling, a non-probability sampling method. With non-probability sampling, the likelihood of any particular member of the target group being chosen is not known (Allan & Skinner, 1991). Participants were arbitrarily selected, relying on the researcher's judgment and their willingness to participate. Quota sampling involves the selection of participants according to their characteristics. Participants needed to meet certain criteria before being eligible for inclusion in the sample (Babbie, 1998).

Questionnaire participants were selected according to the following criteria: Self-compiled questionnaires (Appendix C&D), which were based on a survey created by researchers at the Massachusetts Eye and Ear Infirmary (Bogoch et al., 2005; Chung et al., 2005), were provided to all young adults (n = 501) at the entrance to the venue of the music concert or music festival. Only individuals attending the live music concerts or live music shows at the music festivals were included.

The questionnaire was distributed to a minimum of 100 attendees at each of the five music events, in order to obtain a certain number of responses from young South African adults. Selective sampling was implemented (Allan & Skinner, 1991) in order to reach a minimum of 500 participants within the age restriction of 18 – 30 years.

Although Henderson et al. (2011) suggest that noise-induced threshold shifts due to recreational noise are more common among younger females, and Meyer-Bisch (1996) found that males attend concerts more regularly (1-2 times a month), both male and female young adults were included in this study in order to ensure that the South African population was well represented. Furthermore, this allowed for gender comparisons to be statistically analysed for this specific context.

Questionnaires were provided to attendees between the ages of 18-30 years. According to Mercier and Hohmann (2002), over 50% of all pop and rock concert attendees are between the ages of 16-25 years. However, both West and Evans (1990), and Meyer-Bisch's (1996) results show average ages for concert-goers range from 19 to 25 years. Demographic information and other characteristics such as age of the participants were unknown until completion of the questionnaire. Therefore, once the questionnaire was completed, this criterion could be measured. This allowed for comparisons to be drawn with the results from international studies. For this study it was valuable to determine South African trends in concert attendance and therefore the risk-perception survey was conducted on this specific population group.

3.5.2. Description of participants

Section A of the questionnaire consisted of questions relevant to the demographic information of the participants. Analysis of the data in this section showed there was an equal distribution between males (49.9 %) and females (50.1%).

The responding participants' age distribution showed that the majority of young people attending music concerts and festivals were between 25-30 years old; this is represented in Figure 1.

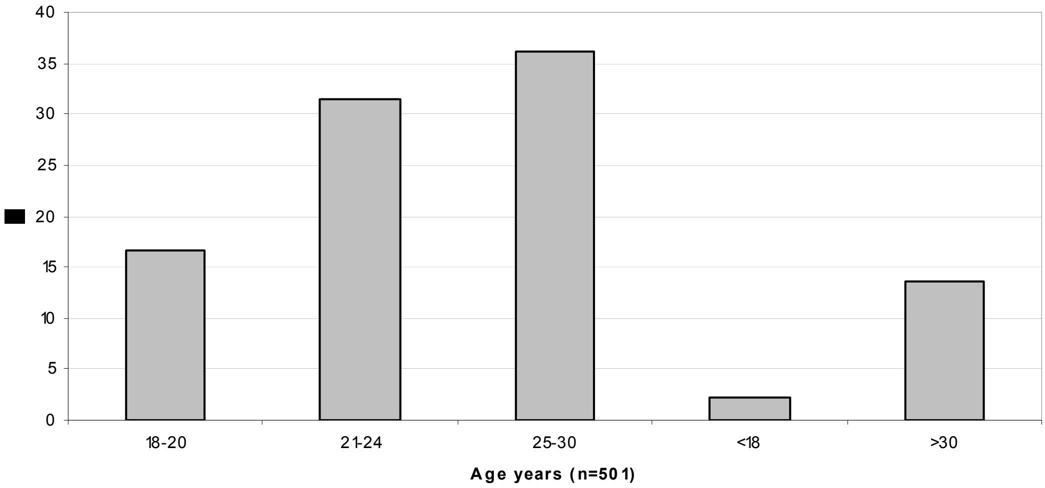

Figure 1: Graphic representation of the age distribution of the participants (%)

The mean age of the males was 24.7 years (SD = 7.1) and 25.6 years for the females (SD = 8.1). Most of the participants reported Matric level education (32.53%). The second largest group was those who had degree qualifications (30.54%). A vast majority of the attendees who participated in the study were employed full-time (57.88%) and earning an average income (47.3%).

3.5.3. Music concerts and festivals

The questionnaire was distributed at five live music events nationally. These five live music events were selected based on date, location, whether it was a concert or a festival, type of music and popularity, including level of attendance, physical layout and design of the venue, as shown in Table 1.

Date	Province	Music event	Estimated attendance	Venue
11-05-2013	Gauteng	Rock Concert	62 000	Open-air stadium
29-06-2013	Mpumalanga	Rock / Pop Festival	34 000	Open-air fields
09-08-2013	Limpopo	Rock Festival	20 000	Open-air fields
13-10-2013	Gauteng	Pop Concert	67 000	Open-air stadium
05-04-2014	KwaZulu-Natal	Rock / Pop Festival	20 000	Open-air fields

Table 1: Description of the music concerts and festivals (n=5)

A list of music concerts and music festivals was drawn up, stating the necessary selection criteria, in order to assist in determining which events would be included in the study. The accessibility was a significant factor to the researcher, as this was relative to the location and time of the music event.

Two music concerts and three music festivals were chosen owing to their geographical location. It was necessary to obtain results across South Africa. Therefore, well-known concerts that took place in Gauteng were chosen and different music festivals were selected to represent other areas of the country.

Gauteng is the smallest of the nine provinces as per land area (16 548km^2), although it is the largest in terms of population (12, 27 million), according to the 2011 Census. KwaZulu-Natal is the second largest (10, 27 million) and Limpopo and Mpumalanga are 5th and 6th after the Cape provinces (5.4 and 4.04 million respectively) (Statistics South Africa Census, 2011). Logistically, it was not possible to travel to the Cape, owing to time and financial constraints.

Furthermore, the type of music was also a critical factor. All of the events were live rock or pop music shows, as the events needed to attract large audiences of no fewer than 10 000 people. Acoustically, the venue design and layout was an essential consideration, as this would affect the sound level measurements. Thus, only open-air venues were selected. Additionally, the date of the event was an important contributing factor in order to fit into the timeline of the study.

The sampling of the music events necessary for this research study was limited by the above-mentioned selection criteria, in order to ensure that the information obtained could be used to produce a valuable scientific contribution and allow for generalisation of the results to the population about which conclusions were drawn (Greenfield, 1996). All concerts and festivals remained anonymous and confidentiality was maintained throughout the completion of the study.

3.6. Material and apparatus

3.6.1. Questionnaire

3.6.1.1. Aim and content of the questionnaire

The primary data collection method used in this investigation was a risk-perception survey in the form of a questionnaire. The aim of the questionnaire was to obtain valid and reliable information from young South African adults attending live music shows, in order to investigate the perceptions regarding the level of the amplified music, the relative risk on hearing ability, and the use of personal hearing protection.

The questionnaire consisted of four sections based on two surveys identified in the literature review, namely: a survey created by researchers at the Massachusetts Eye and Ear Infirmary, the Harvard School of Public Health, and Cogent Research, Inc. (Chung et al., 2005) and a Likert scale questionnaire developed by Bogoch et al. 2005. A standardised tool is not available for the South African context, owing to the types of national music events and the nature of this research; one questionnaire that included all the areas of investigation was not available. Therefore, the two tools were adapted in order to include not only general perceptions and awareness as well as risk perceptions, but also attitudes towards prevention and intervention options. In order to ensure that the South African population was well represented, the questionnaire was provided in English and Afrikaans. It consisted of the following:

- Demographic Information

Questions regarding the participants' sex, age, level of education and social economic status were included, based on a thorough literature review. Olsen-Widen and Erlandsson (2004) stated that socio-economic status would affect attitudes towards excessive leisure noise. Furthermore, it has been suggested that social norms affect risk-taking behaviour (Olsen-Widen & Erlandsson, 2007). This demographic information allowed for contextually-relevant findings and ensured that the inclusion and exclusion criteria for participation in the investigation were met. It was important to ensure that young adult concert or festival attendees throughout South Africa were included in this research study, so that the findings could be generalised to the South African context (Babbie, 1998).

- General perceptions regarding live music shows

The purpose of this section was to identify the general perceptions of amplified music among young South African adults. Bogoch et al. (2005) constructed a questionnaire investigating the perceptions of rock concert attendees about the risk of NIHL and use of hearing protection at a busy Toronto rock concert venue. This questionnaire was adapted for the second section in order to determine perceptions regarding loud music in terms of the South African live concerts and outdoor music festival context. According to Zhao et al. (2010) and Sahdra et al. (2002), further studies are needed to understand the relationship between exposure to loud music, the risk of developing a hearing loss and views on hearing protection in order to develop effective intervention methods. Not only was the investigation of perceptions of concert attendees of assistance in analysing the attitudes towards excessively loud music levels, but it could also be used to quantify the frequency with which live music shows are attended by this population group in South Africa.

- Risk-perception regarding amplified music and hearing damage

A survey created by researchers at the Massachusetts Eye and Ear Infirmary (Chung et al., 2005) was adapted for this section. Questions from this survey were used in the questionnaire, but they were expanded upon to gain further insight into how risk perceptions of young people affect their behaviour. It is important to note the attitude and perceptions of a specific population, but it is more valuable to analyse these perceptions relative to the amount of risk associated with them. A study by Olsen-Widen and Erlandsson (2007) concluded that if people believe that exposure to loud music without wearing hearing protection is an acceptable norm, regardless of the accuracy of this perception, they are more likely to become involved in risk-taking behaviour regarding their hearing. Furthermore, risk perception is greatly affected by context and culture (Strasburger, 1989), therefore this section was adapted to provide an insight into the culture of young South African adults. It addressed risk perception regarding amplified music levels at live music shows and attitudes towards hearing loss, providing a starting point for hearing education and awareness.

- Attitudes towards personal hearing protection

This section was adapted from the web-survey created by researchers at the Massachusetts Eye and Ear Infirmary (Chung et al., 2005). According to Olsen-Widen and Erlandsson (2004), the use of hearing protection is related to the attitudes of those who should wear them. This section focuses on the attitudes of young South African adults attending live music shows. Perceptions regarding personal hearing protection are important to investigate, in order to assess the willingness of this population to be proactive in terms of intervention towards hearing loss related to excessive recreational noise.

3.6.1.2. Structure of the questionnaire

The questionnaire was comprised of four sections consisting of 20 closed-ended questions. A maximum of 20 closed-ended questions was used to ensure ease and speed of completion for participants when responding and this also provided quantifiable data when analysed. Closed-ended questions provided the respondent with a limited number of specific alternatives from which they could choose one or more to answer the question (Berdie & Anderson, 1974). This question type is favoured, as it simplifies the data recording and analysis process. It is also advantageous, since this was a large-scale survey and closed-ended questions take less time for both the participant and the researcher. Moreover, it was a less expensive method (Hague, 1993).

The sequence of the questions in a questionnaire influences the responses and this was therefore carefully considered (Schuman et al. 1981). The questions were subsequently ordered in a logical sequence throughout sections A to D. Nonetheless, certain limitations regarding the use of questionnaires exist, and these include incomplete questionnaires and a high refusal rate, as well as the possibility that they could become very sample- and context-specific (Berdie & Anderson, 1974). Despite these disadvantages, however, questionnaires are the most widely-used gathering technique and were chosen for this study due to the limited time frame and the need to cover a population from a wide geographical area (Mouton, 2001).

3.6.1.3. Pilot study

A pilot study was conducted prior to the commencement of this research, as it was a successful way of determining if the questionnaire was feasible, practicable and effective in achieving the identified aims of the study (Leedy & Ormrod, 2005; Babbie & Mouton, 2001).

A preliminary study was conducted in order to determine the validity of the questionnaire necessary for the survey section of this investigation. The participants were similarly selected through quota sampling, based on their age and attendance at music concerts or music festivals, as outlined by the literature and research methodology. One participant's first language was English and the second participant was a first language Afrikaans-speaker. They each reviewed the English and Afrikaans questionnaires respectively, and provided comments regarding improvements in question order, structure, appropriateness, general layout and clarity. These two participants were excluded from the main study. The researcher then re-evaluated the questionnaire, taking the participants' comments and suggestions into account and made the appropriate adjustments.

Information received from the participants in the form of an email, was analysed descriptively in terms of question order, structure, appropriateness, general layout and clarity. All comments were taken into consideration. The results of the pilot study are summarised in the table below, and were used to adapt the questionnaire before distribution at concerts and music festivals across South Africa. This ensured that the content and construct of the questionnaire was valid and reliable.

Aspects considered	Comments	Adaptation
Question order	Demographic information should be at the beginning	Section moved from 4th to 1st
Question structure	Good	None
Appropriateness of questions	'Income' question may be inappropriate	'Prefer not to answer' option included
	Add online shopping answer	'Internet' option included
General layout	Delete empty blocks causes confusion	Deleted outlines where there are no options
Clarity	Good	None

Table 2: Results obtained from the pilot study

The content of the questionnaire was finalised once an in-depth literature review, as well as the pilot study, had been completed. The questionnaire was re-coded on a risk scale for data analysis once the content was finalised. This coding was employed in order to group the information obtained into levels of risk, which was the assigned unit of meaning (Berdie & Anderson, 1974). By incorporating coding into the construction of the questionnaire, the recording and analysis of information obtained was more efficient and structured.

3.6.2. Personal noise dosimeters

Three sponsored personal noise dosimeters known as CR: 110A Cirrus dose badges were used for the dosimetry measurements which aimed to determine the A-weighted SPL levels expressed as Laeq (dB), Lex (dB), LAE (dB), average dose (%), estimated dose (%), average exposure (P), estimated exposure (P) and peak (dBC) of the amplified music at the music concerts and music festivals.

This dosimeter was the preferred instrument for the noise measurements in this study, for the reason that sound level meters measure at discrete times and dosimeters measure continually over a period of time, therefore providing a more accurate estimate of risk. The average Lex (dB) measurement provides levels relative to the 8-hour duration; these are important data since they allow for comparisons with regulations and damage risk criteria. The dosimeters were used to capture equivalent continuous A-weighted sound pressure level (Laeq dB), which provided measurements relative to the concert duration and the maximum C-weighted peak sound pressure level (dBC) at the five different live music shows.

The CR: 110A dose badges were easy to use, highly portable and it was possible to download measurements to a software programme allowing measurements to be stored for later reference (Control of noise at work regulations, 2005).

3.7. Research methods and procedures

3.7.1. Questionnaire

The questionnaire (Appendix C&D) was distributed at the entrance of five different venues by three volunteers at the start of the event. The questionnaires were completed at the actual events. Participants were informed verbally of the intent of the questionnaire and that participation was voluntary. Should the participant agree to complete the questionnaire, informed consent was granted. The questionnaire was completed at the venue in the participants' own time. Only comprehensively-completed questionnaires received from South African adults aged 18 to 30 years were included in the research study.

Through the use of the questionnaire survey method, a wide geographical area was covered, therefore the study has the potential to generalise to the larger population. These data were coded and transcribed onto an Excel sheet in order for them to be processed statistically.

3.7.2. Dosimetry measurements

The dosimetry measurements were collected by means of the following procedure:

- CR: 110A Cirrus dose badges were worn by three volunteers that were trained and well-informed on the calibration, use and maintenance of the noise dosimeter. These individuals were placed at three different locations (front, middle, and back relative to the stage or main speakers) at music concerts and festivals around the central source of amplified music.
- The sampling procedure was conducted whilst all three volunteers were within their specified location for the same period of time and the investigator recorded the starting and ending times in order to ensure accuracy. Three measurements were taken: at the beginning, in the middle and towards the end of the event.
- The volunteers assisted in measurements of sound pressure levels at the five different venues for a specified duration of time. They were informed on the use and intent of the dosimeter to ensure accurate and reliable recordings at each event.
- The volunteers participated willingly and were instructed to avoid touching, tapping or interfering with the microphone of the dosimeter. The dose badge was only handled and removed by the researcher. The researcher was present to guide and supervise all three of the volunteers at all times.
- Throughout the process of the dosimetry measurements; the general procedures specified by the Department of Consumer and Employment Protection (2005) were used:

- The battery life was checked. Data may be lost if they are only recorded on the dosimeter's memory and the battery is removed for longer than thirty minutes. Therefore, prompt downloading was required.
- The instrument's sampling mode and calibration were checked by the researcher prior to noise measurements, and adjusted when necessary in order to ensure valid and reliable results.
- The microphone was secured to the collar or shoulder of the data collector by the researcher. The manufacturer's manual was used to ensure that any specific requirements regarding microphone orientation were met, in order to avoid any compromised data collection.
- At the end of the measurement period, the recording session was stopped and the dosimeter was removed by the researcher. The final readings were recorded.
- The calibration of all dosimeters was re-checked to ensure validity of results. Any dosimeter that fell outside the calibration limits following the recording was excluded from analysis.

Three different measurements took place concurrently: in the front, in the middle and at the back of the event. The measurements were recorded according to the duration of the event: in the beginning, in the middle and towards the end. At the second live concert in Gauteng, difficulties were experienced with the middle position dose badge. The difficulty was battery-related and no measurements were obtained. This issue was reported to the manufacturer and it was subsequently repaired for future testing. At the outdoor festivals, however, further logistical challenges were encountered. The dosimetry measurements recorded were shorter in duration, mainly owing to over-crowding and movement around different stages. The bands did not play continuously on a single stage. The performances rotated and therefore the music genre changed and it became difficult to manage the three volunteers simultaneously. However, this was managed to the best of the researcher's ability and the measurements were obtained in three different time slots rather than over a continuous period of 2-3 hours. These three measurements were then mathematically added and divided by three in order to calculate the average.

3.8. Data coding and analysis

In order to make quantitative data analysis possible, the individual ordinal scale responses to the questions were transformed and recoded into a continuous “risk” scale. The risk scale was created by assigning a value of “1” to the items of lowest risk, “2” to the items of average risk and “3” for the items of greatest risk. A total subsection score was calculated for each of the three sections of the questionnaire.

Subsection A of the questionnaire was related to the different participant demographics: gender, age, level of education, employment status and income status. These factors provided the independent variables for the statistical analysis. The maximum total score on the questions in both subsections B and C was “12”. Subsection D had a maximum total score of “9”. The total sub-scores in the different subsections (section B – D) functioned as the dependent variables for the calculation of inferential statistics. Additionally, an overall total score was calculated by collating the three subsections B, C and D of the questionnaire. The maximum possible total score for the survey was “33”.

IBM SPSS v22 software programme was used for the statistical analysis of these data to yield percentages and frequency distributions, which were graphically represented as mean and standard deviation tables and figures. Descriptive statistics were used to describe characteristics of both the participants and the sound pressure levels at the music events. The inferential statistics were used to evaluate significant differences between the scores observed. The Mann-Whitney U statistic was used for comparison of two variables including inter-group comparisons. The Kruskall-Wallis test was used for comparisons of more than two variables. A significance level of $p < 0.05$ was used.

3.9. Trustworthiness

In order to facilitate trustworthiness of the study, the issues of reliability and validity were addressed.

Reliability is the consistency with which a measuring instrument yields a certain result when the entity being measured does not change (Leedy & Ormrod, 2005). To enhance the reliability of the study, the questionnaire was standardised and coded. An English version of the questionnaire was translated into Afrikaans and proofread in order to allow respondents at Afrikaans music festivals to participate in their mother tongue. Specific criteria were established to dictate the types of judgments made by the researcher (Burgess, 1993), to prevent researcher bias and to ensure that all respondents participated of their own free will, providing truthful and reliable answers.

According to Struwig and Stead (2003), validity can be defined as the extent to which a research design is scientifically sound or appropriately conducted. The researcher guaranteed face validity of the questionnaire and that the included items truly measure what they claim to measure. Content validity was ensured and the questionnaire items represented the necessary aspects of this particular research topic. Construct validity refers to the extent to which a test, which in the case of this study is the questionnaire, measures the theoretical construct it aims to measure (Allan & Skinner, 1991). Therefore, the questionnaire was only formulated once the construct had been clearly defined and a pilot study had been conducted to verify its validity. Descriptive validity was maintained throughout the presentation and discussion of the results, and no information was omitted or distorted in order to change the outcomes of the study (Struwig & Stead, 2003).

3.10. Summary

Chapter Three has detailed the research methodology adhered to in this study. The procedures implemented in the research methodology were dictated by the main aim and sub-aims that were formulated in order to answer the research question.

The selection of a descriptive, quantitative research design provided the study with structure. The study population, namely the questionnaire participants, and the music events were described, as well as the specific selection criteria.

The material and methods, which included the risk-perception questionnaire and the dosimetry measurements, were specified. This was followed by an account of the procedures adhered to during the data collection and the procedures necessary for statistical analysis of the data. Lastly, the research was initiated and conducted within the framework of the ethical considerations reported.

CHAPTER FOUR

RESEARCH RESULTS

4.1. Introduction

NIHL has become more prevalent among younger people (Shargorodsky et al., 2010). This noise is associated with recreational activities and advancements in the availability and accessibility of amplified music (Sahdra et al., 2005; Serra et al. 2005; Morata 2007). Recreational NIHL needs to be addressed by means of hearing health risk preventative strategies and recreational noise management.

In order to develop and initiate these guidelines, noise limits and methods of prevention and intervention, it is necessary to identify and evaluate the risk perception towards this recreational noise and the negative effects this noise may have on the auditory systems of young people. The current study has provided quantitative data describing the risk perception of young people towards recreational noise present at five live music concerts and festivals in South Africa. This chapter presents the results of the data collected from dosimetry measurements and the results obtained from the statistical analysis of the risk-perception survey.

4.2. Music events

Five music events were selected according to specified criteria. As it was necessary to obtain results across South Africa, four different provinces were visited. Two live music concerts were attended in Gauteng and three live music festivals were attended in Mpumalanga, Limpopo and KwaZulu-Natal.

Personal noise dosimeters known as CR: 110A Cirrus dose badges were used for the dosimetry measurements which aimed at determining the peak (dBC) levels, A-weighted SPL levels expressed as Laeq (dB), and Lex (dB) of the amplified music at the music concerts and music festivals. The results of these measurements are presented in Table 3.

Sound level parameters	Gauteng 1 concert	Gauteng 2 Concert	Mpumalanga festival	Limpopo festival	KwaZulu-Natal festival
Peak dBC					
Front	144.1	134.7	135.9	136.9	136.4
Middle	140.8	No data	124.2	134.5	133.5
Back	133.5	139.0	124.4	130.0	128.6
Laeq dB					
Front	101	99.5	97.5	102.3	98.3
Middle	99.5	No data	91.9	102.1	94.1
Back	98.6	96.5	93.1	97.1	88.7
Lex 8h dB					
Front	95.5	96.4	81.7	87.6	91.1
Middle	94	No data	76.4	87.4	86.7
Back	93.1	93.8	77.6	83.1	88.7

Table 3: Overview of the sound level measurements for the five live music events at different positions (front, middle and back)

As shown in Table 3, the highest peak sound pressure levels (dBC) were obtained at the live concert in Gauteng 1, in the front (144.1dBC) and middle (140.8dBC) positions. The lowest peak measurements were obtained at the music festival in Mpumalanga in the middle (124.2dBC) and the back (124.4dBC) positions. The average Laeq results show the A-weighted sound pressure levels in terms of the concert duration. The highest measurements relative to the duration of the event were obtained at the music festival in Limpopo in the front (102.3dBA) and middle (102.1dBA) positions.

The Lex 8h parameter was deemed necessary in order to make accurate comparisons with current legislation regarding occupational noise regulations and legislation relative to the 8-hour duration for damage risk criteria. All of the measurements obtained were greater than 85dBA, the maximum level allowed in current occupational legislation, except for the results for the music festival in Mpumalanga and the back position (83.1dBA) in Limpopo.

4.3. Risk perceptions

The data obtained from the risk perception survey (n=501) were coded in terms of a risk scale; “1” indicating low, “2” indicating average, “3” indicating high risk perception. A total value of “33” for all three subsections of the questionnaire combined was the maximum risk-perception score that could be obtained. The influence of the following independent factors on the risk-perception score was statistically analysed: gender, age, education, employment and income status. Global scores were calculated by mathematically summing the partial scores obtained in each of the three subsections of the questionnaire, in order to evaluate the overall risk perception of young people towards amplified music at music events.

Factors	N	Mean	Standard deviation	Min	Max	Test statistic (Sig. level)
GENDER						Mann-Whitney U test (*p*= .004)
Male	250	21.66	3.66	14	30	
Female	251	20.75	3.54	11	31	
AGE						Kruskall-Wallis test (*p*= .041)
18-20	83	22.19	3.05	15	30	
21-24	158	21.33	3.54	13	29	
25-30	181	20.73	3.74	11	30	
<18	11	20.55	3.01	16	24	
>30	68	21.07	4.04	13	31	
EDUCATION						Kruskall-Wallis test (*p*= .245)
Matric	163	21.55	3.52	14	30	
certificate	40	20.63	3.52	15	27	
diploma	72	20.67	3.85	13	28	
degree	153	21.42	3.62	11	31	
postgraduate	73	20.82	3.65	13	29	
EMPLOYMENT						Kruskall-Wallis test (*p*= .003)
student	118	21.51	3.53	13	30	
part-time	44	22.43	2.7	15	27	
full-time	290	20.80	3.73	11	30	
unemployed	16	21.88	2.71	17	26	
homemaker	7	25.00	4.66	19	31	
other	26	20.77	3.45	15	27	
INCOME						Kruskall-Wallis test (*p*= .066)
above average	151	21.30	3.59	14	30	
average	237	20.96	3.56	11	31	
below average	35	20.6	3.78	14	29	
don't know	37	22.73	3.49	14	30	
no answer	41	21.31	3.86	14	27	

Table 4a) Total scores obtained for global risk perception (overall scores, n=501)

4.3.1. Global risk perceptions

Gender

Table 4a shows the global risk-perception scores obtained for the different independent factors. The influence of gender was measured with an equal distribution of males (n=250, 49.9%) and females (n=251, 50.1%) in the study sample. Table 4a shows that the global score profile obtained for the males was on average higher than that obtained for the females (mean=20.75, SD=3.54). The higher mean score for the male participants was found to be statistically different from the mean obtained for the females (Mann-Whitney U test, p = .004).

Age

The different age groups of all study participants were categorised into five groups: 18-20, 21-24, 25-30, <18, and >30 years of age. Table 4a shows that the youngest group (<18 years) obtained the lowest score (mean=20.55, SD=3.01), while the age group 18 to 20 years obtained a higher mean global score (mean=22.19, SD=3.05) than those in the group 20 to 30 years of age.

The difference in global risk-perception scores showed itself to be statistically significant (Kruskall-Wallis test, p= .041). In order to evaluate between which age groups this difference was significant, post-hoc testing was performed by applying multiple individual paired-wise Mann-Whitney U tests. This analysis showed only one strong significant difference: namely, between the mean global score in the age group 18 to 20 years and the age group 25 to 30 years (p= .019). All of the other groups presented average global risk scores, not being significant from each other. The overall results regarding the influence of age on global risk perception show for young people between 18 to 30 years; the 18 to 20 year old age group produce higher mean global risk scores than the 25 to 30 year olds age group.

Education

Education level was categorised into five groups: Matric, certificate, diploma, degree and postgraduate. As shown in Table 4a, those with Matric level qualifications (mean=21.55, SD=3.52) obtained higher mean scores than those with tertiary qualifications, certificate (mean=20.63, SD=3.52), diploma (mean=20.67, SD=3.85), degree (mean=21.42, SD=3.62) and postgraduate (mean=20.82, SD=3.65). No statistically-significant differences between the means scores obtained for these groups was found (Kruskall-Wallis test, *p*=.245).

Employment

The employment status was grouped into: student, part-time, full-time, unemployed, homemaker and lastly an 'other' category. The global risk-perception scores represented in Table 4a show that the influence of the different employment groups on the overall total scores was statistically significant (Kruskall-Wallis test, *p*=.003) and, furthermore, that the homemakers were the group with the highest mean score (mean=25.00, SD=4.66).

In order to evaluate between which employment groups the different global risk perception scores were significant, post-hoc testing was carried out through the use of multiple individual paired-wise Mann-Whitney U tests. This analysis showed three significant differences between the mean global scores of those employed part-time and full-time (*p*=.057), full-time employed and the homemakers (*p*= .027) and, lastly, the homemakers and the 'other' category (*p*= .062).

Income

The income status groups were categorised into five groups: above average, average, below average, don't know and prefer not to answer. These groups were statistically analysed and the results are shown in Table 4a. The income group that answered 'don't know' showed the highest global risk-perception score (mean=22.73, SD=3.49). The lowest overall score was observed for the below average income group (mean=20.60, SD=3.78).

A borderline significant difference (p= .066) was found for the global risk-perception scores between the different income groups. However, a greater significant difference between the 'don't know' group and average income was found (Kruskall-Wallis test, *p*= .045).

4.3.2. General risk perceptions

In order to determine the general risk perception regarding loud music at concerts and festivals, four questions were presented in the second subsection of the questionnaire (n=501). These data were similarly coded in terms of a risk scale with a maximum total score of twelve for this subsection. The following aspects - gender, age, education, employment and income status - were statistically analysed. Table 4b provides the mean scores, standard deviations, range of values and statistical significance for comparison of the participants' demographics and the influence on general risk perceptions.

Factors	N	Mean	Standard deviation	Min	Max	Test statistic (Sig. level)
GENDER						Mann-Whitney U test (*p*= .006)
Male	250	8.5	2.23	4	12	
Female	251	7.91	2.48	4	12	
AGE						Kruskall-Wallis test (*p*= .046)
18-20	83	8.63	2.04	4	12	
21-24	158	8.42	2.48	4	12	
25-30	181	7.78	2.44	4	12	
<18	11	8.45	2.07	5	12	
>30	68	8.28	5.50	4	12	
EDUCATION						Kruskall-Wallis test (*p*= .037)
Matric	163	8.37	2.49	4	12	
certificate	40	8.43	2.19	4	12	
diploma	72	7.54	2.56	4	12	
degree	153	8.46	2.2	4	12	
postgraduate	73	7.82	2.49	4	12	
EMPLOYMENT						Kruskall-Wallis test (*p*= .020)
student	118	8.40	2.4	4	12	
part-time	44	8.80	2.26	4	12	
full-time	290	7.96	2.43	4	12	
unemployed	16	8.94	1.91	4	11	
homemaker	7	10.29	1.7	7	12	
other	26	8.08	2.42	4	12	
INCOME						Kruskall-Wallis test (*p*= .332)
above average	151	8.25	2.49	4	12	
average	237	8.1	2.38	4	12	
below average	35	7.86	2.48	4	12	
don't know	37	8.92	1.96	4	12	
no answer	41	8.32	2.5	4	12	

Table 4b) Scores obtained for general risk perception (n=501)

Gender

Table 4b shows that the males in the study sample (mean=8.5, SD=2.3) obtained a greater general risk-perception score than females (mean=7.91, SD=2.48). The difference between the two mean scores was statistically significant (Mann-Whitney U test, *p*= .006). The general risk-perception scores show that, similar to the global risk-perception profile, gender is influential, with the males on average showing higher risk-perception profiles.

Age

The general risk-perception scores observed for the age groups were similar to the results obtained for the global risk perception. Table 4b shows that the 18 to 20 year old age group obtained the highest general risk-perception score (mean=8.63, SD=2.04). Similarly, the differences between the general risk-perception scores obtained for the different age groups was statistically significant (Kruskall-Wallis test, *p*=.046).

In order to evaluate between which age groups the difference was significant, multiple individual paired-wise Mann-Whitney U tests were carried out. This post-hoc analysis showed that there was only a borderline significant difference between the mean score in the age group 18 to 20 years, and the older group of 25 to 30 year olds (*p*=.059).

Education

The influence of the level of education yielded similar mean scores for all five groups. However, these scores differed from those obtained for global risk perception, indicating that the highest mean score (mean=8.46, SD=2.2) was obtained for those with degrees and not those with Matric level qualifications, as shown in Table 4b. Nonetheless, the values were similar for those with the second and third highest general risk-perception scores, certificates (mean=8.43, SD=2.19) and Matric level qualifications (mean=8.37, SD=2.49). The lowest score was obtained for those with diplomas (mean=7.54, SD=2.56).

The differences between the mean scores obtained for the different levels of education proved to be statistically significant (Kruskall-Wallis test, p= .037). In order to evaluate between which education level the difference was significant, multiple individual paired-wise Mann-Whitney U tests were carried out, suggesting that there was only a borderline significant difference between the mean score of the degree group and those with diplomas (p=.055).

Employment

Table 4b shows that, similar to the results for global risk perception, the homemakers obtained the greatest general risk-perception score (mean=10.29, SD=1.70). The second highest score was observed for the unemployed group (mean=8.94, SD=1.91). The observed differences between the mean scores obtained for the different employment groups was statistically significant (Kruskall-Wallis test, p= .020).

Income

The participants in the study sample who answered 'don't know' on level of income scored the highest general risk-perception score (mean=8.92, SD=1.96). This result concurs with that observed for the influence of income on the global risk perception. However, the different general risk-perception mean scores between the income groups did not prove to be statistically significant (Kruskall-Wallis test, p= .322). Furthermore, post-hoc testing was conducted with multiple individual paired-wise Mann-Whitney U tests. This analysis showed no significant differences for the general risk-perception mean scores obtained between the six employment categories and separately between the five income categories.

4.3.3. Auditory-specific risk perceptions

In order to determine the risk perception regarding loud music and hearing-related symptoms, the data were similarly coded in terms of a risk scale with a maximum total value of twelve for this subsection which consisted of four questions. The following independent factors - gender, age, education, employment and income status - were again taken into account and the influence of these demographic factors on the auditory-specific risk perception are represented in Table 4c.

Factors	N	Mean	Standard deviation	Min	Max	Test statistic (Sig. level)
GENDER						Mann-Whitney U test (*p*= .684)
Male	250	6.51	1.58	4	12	
Female	251	6.57	1.6	4	12	
AGE						Kruskall-Wallis test (*p*= .989)
18-20	83	6.55	1.4	4	11	
21-24	158	6.51	1.58	4	12	
25-30	181	6.54	1.59	4	11	
<18	11	6.36	1.29	4	9	
>30	68	6.6	1.87	4	12	
EDUCATION						Kruskall-Wallis test (*p*= .974)
Matric	163	6.49	1.38	4	11	
certificate	40	6.45	1.45	4	10	
diploma	72	6.57	1.71	4	10	
degree	153	6.6	1.72	4	12	
postgraduate	73	6.49	1.7	4	12	
EMPLOYMENT						Kruskall-Wallis test (*p*= .027)
student	118	6.49	1.56	4	11	
part-time	44	6.84	1.31	4	9	
full-time	290	6.49	1.56	4	12	
unemployed	16	6.25	1.69	4	10	
homemaker	7	8.43	2.99	4	12	
other	26	6.46	1.61	4	10	
INCOME						Kruskall-Wallis test (*p*= .310)
above average	151	6.59	1.49	4	11	
average	237	6.44	1.58	4	12	
below average	35	6.86	1.82	4	10	
don't know	37	6.86	1.6	5	12	
no answer	41	6.32	1.72	4	11	

Table 4c) Scores obtained for auditory specific risk perception (n=501)

Gender

As shown in Table 4c, the results obtained for the males (mean=6.51, SD=1.58) and females (mean=6.57, SD=1.6) were quite similar in terms of risk perception towards auditory damage from loud noise. Moreover, no statistical difference between the auditory-specific risk-perception mean scores of the males and females in the study sample was found (Mann-Whitney U test, *p*= .684). This result is contrary to that observed for the influence of gender on the global and general risk-perception scores which found that males on average showed greater scores.

Age

Analysis on the different age groups yielded similar auditory-specific risk-perception mean scores for all five groups. As represented in Table 4c, the mean values were similar for those between 18 to 20 years (mean=6.55, SD=1.4) and 25 to 30 years of age (mean=6.54, SD=1.59). The highest score was observed for those older than 30 years of age (mean=6.6, SD=1.87). This result is contradictory to the results obtained regarding the global, as well as the general risk perception, which indicated that the younger population scored a higher risk-perception score. However, there were no statistically-significant differences between the different auditory-specific risk-perception scores (Kruskall-Wallis test, *p*= .989). Furthermore, multiple individual paired-wise Mann-Whitney U tests were used in order to evaluate between the age groups which differences were significant, and no significant differences were found.

Education

As shown in Table 4c, the level of education revealed that those with degrees obtained the highest auditory-specific risk-perception score (mean=6.6, SD=1.72), a result which is similar to that obtained for the general risk perception. However, it differs from the results obtained for global risk perception. These results suggest that those with degrees, not Matric level qualifications, observed the highest scores. However, the auditory-specific risk-perception scores were quite similar across all of the education categories and the differences observed did not prove to be of statistical significance (Kruskall-Wallis test, *p*= .974). Furthermore, a post-hoc evaluation of inter-group differences with the use of multiple individual paired-wise Mann-Whitney U non-parametric tests showed no statistical significance.

Employment

As seen in Table 4c, the homemakers again observed the highest auditory-specific risk-perception score (mean=8.43, SD=2.99). This was consistent with the results obtained regarding the influence of employment on general and global risk perception. The differences between the employment group mean scores proved to be statistically significant (Kruskall-Wallis test, *p*=.027). In order to evaluate between which employment groups the difference was significant, post-hoc testing was conducted with multiple individual paired-wise Mann-Whitney U tests. This analysis found that significant differences occurred between homemakers and all of the other groups, apart from those that reported part-time employment. The significant differences between homemakers and students, full-time, unemployed and the other group were: *p*=.020; *p*=.017; *p*=.029; and *p*=0.41 consecutively.

Income

As shown in Table 4c, the participants who answered 'don't know' (mean=6.86, SD=1.6) observed the highest auditory-specific risk-perception scores. This result concurs with that obtained for the global and general risk perception. However, those who answered 'below average' also obtained this high score (mean=6.86, SD=1.82) and the differences between the risk perception scores did not prove to be statistically significant (Kruskall-Wallis test, *p*= .310).

4.3.4. Risk perceptions towards hearing-risk preventative strategies

In order to determine the perceptions towards prevention and intervention options, data were once more coded in terms of a risk scale, with a maximum total value of nine for this subsection. Similarly, the independent demographic factors were used for statistical analysis. These results are shown in Table 4d.

Factors	N	Mean	Standard deviation	Min	Max	Test statistic (Sig. level)
GENDER						Mann-Whitney U test (*p*= .013)
Male	250	6.66	1.78	3	9	
Female	251	6.27	1.67	3	9	
AGE						Kruskall-Wallis test (*p*= .015)
18-20	83	7.01	1.43	3	9	
21-24	158	6.41	1.84	3	9	
25-30	181	6.41	1.72	3	9	
<18	11	5.73	1.49	3	9	
>30	68	6.19	1.8	3	9	
EDUCATION						Kruskall-Wallis test (*p*= .024)
Matric	163	6.69	1.68	3	9	
certificate	40	5.7	1.99	3	9	
diploma	72	6.56	1.62	3	9	
degree	153	6.36	1.74	3	9	
postgraduate	73	6.51	1.74	3	9	
EMPLOYMENT						Kruskall-Wallis test (*p*= .503)
student	118	6.62	1.75	3	9	
part-time	44	6.8	1.46	3	9	
full-time	290	6.36	1.73	3	9	
unemployed	16	6.69	1.89	3	9	
homemaker	7	6.29	1.5	3	7	
other	26	6.23	2.08	3	9	
INCOME						Kruskall-Wallis test (*p*= .097)
above average	151	6.47	1.76	3	9	
average	237	6.42	1.67	3	9	
below average	35	5.89	1.84	3	9	
don't know	37	6.95	1.87	3	9	
no answer	41	6.73	1.73	3	9	

Table 4d) Scores obtained for perceptions towards hearing risk prevention (n=501)

Gender

Table 4d shows that the results regarding the influence of gender similarly showed that the males in the study sample on average obtained a higher risk-perception score towards preventative measures (mean=6.66, SD=1.78) than the females (mean=6.27, SD=1.67). The higher mean score for the male participants was found to be statistically different from the mean obtained for the females (Mann-Whitney U test, p= .013).

Age

The five different age groups, as seen in Table 4d, show that the 18 to 20 year old group observed the highest risk-perception score towards preventative measures (mean=7.01, SD=1.43). This result is consistent with that observed for the global and general risk perception. The lowest score was obtained by those younger than 18 years (mean=5.73, SD=1.49). The differences obtained between the mean scores were statistically significant (Kruskall-Wallis test, p= .015). Multiple, individual paired-wise Mann-Whitney U tests were carried out post-hoc. This analysis revealed significant differences between the 18 to 20 year old groups and all of the older groups. The significant differences between the 18 to 20 year olds and 21 to 24, 25 to 30, and older than 30 years age groups were: p=.072; p=.065; and p=.030 consecutively.

Education

Table 4d shows that the highest risk-perception score towards preventative measures obtained for the education groups was for those with Matric level qualifications (mean=6.69, SD=1.676). This was similar to the results for the influence of education on the global risk perception. The lowest score was observed for those with certificates (mean=5.70, SD=1.99). Conversely to the results obtained for the global risk perception, these differences were statistically significant (Kruskall-Wallis test, p= .024). Furthermore, multiple individual paired-wise Mann-Whitney U tests provided evidence post-hoc, that differences between the education groups were significant. Namely, between those with Matric level and certificate level (p = .011), and those with certificate level and diploma level education (p= .089).

Employment

As shown in Table 4d, the results observed differed from those regarding the global, general and auditory-specific risk perceptions, showing that those who were employed part-time showed the highest risk perception score (mean=6.8, SD=1.46) and not the homemakers. The group with the second highest risk-perception score towards preventative measures was observed for those who stated that they were unemployed (mean=6.69, SD=1.89). Nevertheless, no statistically-significant differences were found between the mean scores obtained for the employment groups (Kruskall-Wallis test, p= .503).

Income

As seen in Table 4d, the participants who answered 'don't know' on level of income showed the highest risk-perception score towards preventative measures (mean=6.95, SD=1.87). These findings were consistent with the results obtained for the influence of income regarding the other areas of risk perception that were statistically analysed. The differences observed between the mean scores of the different income groups indicated borderline statistical significance (Kruskall-Wallis test, p= .097). Moreover, in order to evaluate between which income groups the difference was significant, multiple individual paired-wise Mann-Whitney U tests were carried out and this post-hoc analysis suggested no significant differences.

4.4. Hearing protection

Three descriptive questions were included in the last section of the risk-perception survey, in order to provide further specific insight into earplug usage amongst the concert or festival attendees. These results showed that the majority of the young people attending these events have never made use of earplugs (45.51%). Moreover, those that stated that they had worn earplugs could not state by whom they were recommended, but 12.97% stated that they were recommended by a friend. Additionally, the majority of young people (42.91%) stated that earplugs could be purchased at pharmacies. Table 5 shows the percentage values of the reasons why those attending music events would wear earplugs.

REASON FOR EARPLUG USAGE	%
Won't wear	54,29
Worried about hearing	30,54
Has hearing loss	0,8
Music too loud	1,8
Ears ring	2
Ears hurt	1
Since World Cup 2010	2,4
Other reasons	7,19
IF PROVIDED AT VENUE	%
Law	34,93
Cheap	10,58
Free	27,35
Peer pressure	8,38
Comfortable	18,76

Table 5: Hearing protection use at music concerts and festivals (n=501)

As shown in Table 5, the majority of attendees at music concerts and festivals state that they will not wear hearing protection (54.29%). The greatest reason for earplug use amongst those who have worn them is due to concern about their own hearing ability (30.54%). Furthermore, the main reason young people would consider wearing earplugs if they were provided at these events would be: firstly, if it was a legal prerequisite (34.93%), secondly, if earplugs were provided for free (27.35%) and thirdly, if the earplugs were comfortable (18. 76%). Peer pressure (8.38%) showed the lowest influence on willingness to comply with hearing-protection behaviour.

CHAPTER FIVE

DISCUSSION OF RESULTS

5.1. Introduction

Bogoch et al. (2005) and Widen (2006) stated that an individual's awareness of the risks of being affected by noise related hearing problems is insufficient to change their behaviour. This can be due to various factors including attitudes towards noise as a result of personal experiences. Moreover some individuals show greater risk taking behaviour than others, which may be due to differences in personality traits (Zuckerman & Kuhlman, 2000). Empirical research suggests that the individual decision about using hearing protection in noisy situations may be governed by more than personality traits, including variables such as social norms, attitudes and risk perceptions (Widen, Bohlin & Johansson, 2011).

The results of the present study which primarily consisted of a risk-perception survey will be discussed by first addressing the music events at which the survey took place. This will be followed by a discussion of the results obtained from the risk-perception survey which targeted young people attending music concerts and festivals in South Africa, in order to explore their risk perception towards recreational noise, auditory-specific symptoms and willingness to use hearing protection strategies.

Dosimetry measurements were conducted at the music events in order to provide descriptive information regarding the exposure to the amplified music on those participating in the survey. Visiting social activities involving recreational noise such as, music concerts can be seen as both positive and negative (Bohlin, Sorbring, Widen & Erlandsson, 2011). What makes music concerts negative or risky, are the sound levels that can reach up to and above 100dB, with up to 70% or more of those attending the music event not making use of any hearing protection (Bogoch et al., 2005). The discussion of the music events, followed by the discussion of the risk perceptions will be presented within the context of existing literature.

5.2. Music events

It is now known that excessive exposure to amplified music results in the same damage in the inner hair cells, resulting in a high frequency hearing loss, as that caused by noise in the occupational setting (Sahdra et al., 2002). The prevalence of which has been increasing in young people, despite the fact that NIHL due to occupational noise has been decreasing (WHO, 1997).

As previously stated by Folmer (2006: p. 248), "young people are often exposed to hazardous levels of loud sound"; an example of which is amplified music. Young people attend music events where they are exposed to sound levels up to 100dBA (Clark, 1992), 110dBA and as high as 126dBA (Opperman et al., 2006). Chung et al. (2005) provided evidence that it is possible for amplified music at concerts to reach excessive levels of 120dBA up to 140dBA. Thus, in order to determine the sound pressure levels present at the music concerts and festivals attended for this investigation, dosimetry measurements were conducted in three different positions throughout the duration of each of the five music events.

These measurements indicated that the position; front, middle, or back, relative to the stage influenced the sound levels obtained. The measurements obtained in the front position were found to be greater than those obtained in the middle or back positions, except for the peak level at the second concert in Gauteng. In addition, majority of the sound levels obtained in the back position showed lower values. The results were probably influenced by the loud speaker placement at the venues, with most of the sound generating from either side of the stage in front of the audience as opposed to placement with a surround system effect. However, the data obtained was statistically insignificant due to the insufficient amount of measurements carried out and inconsistencies with the duration of the different measurements. Therefore the values attained were merely used for descriptive purposes.

The highest peak (dBC) level was obtained in the front of one of the live concerts in Gauteng. The sound levels suggested that music concerts were louder than music festivals with the lowest peak measurements obtained at the music festival in Mpumalanga. The average Laeq (dBA) results were recorded in order to determine the A-weighted sound pressure levels relative to the concert duration. The highest measurements relative to the duration of the event were obtained at the music festival in Limpopo. These results are comparable to earlier international research (Clark, 1992; Chung et al., 2005; Opperman et al., 2006) with all of the sound levels above 85dBA, reaching as high as 102.3dBA.

The Lex 8h parameter was necessary in order to make reliable comparisons with current legislation regarding occupational noise regulations and legislation relative to the 8-hour duration for damage risk criteria. All of the Lex 8h (dBA) measurements were greater than 85dBA apart from the results obtained in Mpumalanga as well as one measurement in Limpopo. If the sound exposure limits for International and National Occupational Health and Safety regulations, which state that "prolonged exposure to equivalent levels more than and equal to 85dBA during 40 hours per week" are applied (OHS, 1993; NIOSH, 1998), amplified music at the two music concerts in Gauteng and the music festivals in Limpopo and KwaZulu Natal may be associated with risk of auditory damage in younger people attending these events (Sliwinska-Kowalska & Davis, 2012).

The extent of this auditory damage is dependent not only on the excessive levels of the amplified music but also on the duration of the exposure to these excessive sound pressure levels. Since hearing damage is proportional to the acoustic energy received by the ear, therefore an exposure to a specific noise level for one hour will result in the same damage as an exposure for two hours to a noise level which is 3dB lower than the original level. This is referred to as the 3dB (A) trading rule and is accepted in most parts of the world (NIOSH, 1998).

There is a great deal of evidence stating that the exposure to loud noise constitutes a significant risk to one's hearing (Widen & Erlandsson, 2007), and yet amplified music in recreational environments, far exceed occupational noise exposure limits (Zhao et al., 2010). These sound levels at recreational events, such as music concerts and festivals, as well as during other loud recreational activities in South Africa require further investigation in order to draw more substantial conclusions.

5.3. Risk perceptions

The results regarding risk perception towards amplified music in the recreational setting in South Africa are discussed in terms of the demographics of the participants, as they relate to the *global*, *general*, *auditory-specific* risk perceptions and attitudes towards *hearing protection strategies* at music concerts and festivals.

The areas concerning *general* risk perception and perceptions regarding *hearing protection strategies* resulted in similar findings. The discussion of the results will be presented below in terms of the influence of gender, age, education, and socio-economic status (SES).

Gender

It is important to take the influence of gender into account, as gender identity plays a significant role in risk perception, particularly our stereotypical images of masculine and feminine (Bohlin & Erlandsson, 2007). The results of the influence of gender on the *global* and *general* risk perceptions as well as the perceptions towards *hearing protection* indicated that males have a tendency to show greater risk than females. This corresponds with the stereotypical images of masculinity and femininity, and how gender differences in terms of behaviour are likely to affect young people's risk perception (Bohlin, Sorbring & Erlandsson, 2010).

Similarly Widen et al. (2011: p. 407) found 'women to be more careful' than men. However women still behaved in a similar manner to men with regards to risk-taking (Widen et al., 2011). It is well documented that potential gender differences regarding recreational noise exist, such as that identified in the current study. These differences may not be limited to the risk perception towards recreational noise at music events as well as the use of protective behaviour, as found in this study, but additionally risk taking behaviour regarding level of noise exposure and choice of leisure time activities (Jokitulppo et al., 1992; Olsen & Erlandsson, 2004; Widen, Holmes & Erlandsson, 2006).

Gender aspects were measured in a study by Gullone and Moore (2000), which indicated that women possibly judged risk situations to be more dangerous than men as suggested by the present findings. However, there was a significant difference in the judgment of risk but no significant difference in the actual behaviour of the genders (Gullone & Moore, 2000). Rock concerts were judged as more risky by women, although they were visited as frequently as men (Bohlin & Erlandsson, 2007). Therefore, young women perceive certain behaviours as ‘more risky’ than young men but they participate in the risky behaviour equally as much as their male counterparts (Bohlin & Erlandsson, 2007: p. 59). The current study showed equal distribution among the genders in terms of participation in the survey, however men were more likely to show greater *global* risk than women and this included higher frequency of attendance to concerts which is contradictory to an earlier study regarding risk behaviour and noise exposure among adolescents (Bohlin & Erlandsson, 2007).

Significant gender differences were obtained by Widen et al. (2011), which similarly administered questionnaires to a sample of just over 500 adolescents (Widen et al., 2011). Although some previous findings stated that gender did not contribute to any explanation of protective behaviour by itself (Olsen &Erlandsson, 2004), recent studies show gender may affect psychological variables such as risk perception, attitudes and perceived vulnerability (Widen et al., 2011) as was suggested by this current study. The social ideal of not being sensitive or vulnerable is an important factor to consider from a gender perspective. Research in Netherlands found that young males expressed low personal vulnerability to music induced hearing loss, furthermore they indicated less inclination to change their music listening habits (Vogel, Brug, Hosli, Van der Ploeg & Raat, 2008).

A qualitative study among 16 adolescents indicated that self-image, risk perception, norms, and ideals are important aspects involved in hearing related risk taking. Moreover the study discusses the possibility that social norms; expectations of how one should behave, and normative ideals; expectations about the type of person you should be, influence the engagement in risky behaviours (Widen & Erlandsson, 2007). This provides comparable findings to the current study; suggesting that men experience more difficulty in acknowledging vulnerability than women (Widen & Erlandsson, 2007).

Regarding gender, it can be stated that young women and men expect to fit into specific gender norms and these findings as well as the findings in this study are all consistent (Bohlin et al., 2010; Widen & Erlandsson, 2007). This discrepancy in the evaluation of risk between genders can be explained using a cultural and social framework (Bohlin & Erlandsson, 2007). However, the results in this study regarding the influence of gender on *auditory-specific* risk perception did not show significant differences.

An important aspect to keep in mind is that questions on risk taking in specific situations may fit men's experiences more than women's, resulting in a different factor structure between the genders (Bohlin et al., 2011). This may be as a result of bias in traditional questionnaires on risk taking towards the tendency to fit a 'male norm' (Bohlin et al., 2010: p. 3). In addition, it seems likely that gender differences may vary according to context and age (Bohlin & Erlandsson, 2007).

Age

Risk perception and subsequent behaviour is influenced by an individual's level of responsibility, maturation or experience (Gullone, Moore, Moss & Boyd, 2000). These aspects are associated with age. In the present study, the age that showed tendencies towards greater risk with regards to the *global* and *general* risk perception, as well as the perceptions towards *hearing protection*, was the 18 to 20 year old age group.

Risk taking does not only represent a threat but an ‘opportunity for maturation’ (Bohlin et al., 2011: p. 311). Some individual’s may believe that risk taking is necessary in order to make new experiences or as a distraction from reality (Widen & Erlandsson, 2007). Adolescence is a time of conflict and questioning; levels of perceived freedom, awareness, death, and anxiety. Moreover different options are sometimes explored through musical experiences (Ellsworth, 1999).

A crucial aspect to account for, when considering the risk of loud amplified music at concerts and festivals and the effect on the auditory system, is the level of attendance. This frequency of exposure may be a co-contributor and is linked to the age of the population. According to Bohlin et al. (2010) younger people have pro-risk attitudes; this positive attitude will more likely result in riskier behaviour, including higher frequency of attendance and less use of protective strategies (Bohlin et al., 2010). Additionally, younger adolescents may engage in riskier activities since this provides them with certain privileges (Siegel & Cousins, 1994).

Attendance tendencies recorded by Mercier and Hohmann (2002) suggest that 53% of all adolescents between 16 to 25 years of age attend pop and rock concerts regularly. Earlier, West and Evans (1990) stated that older adolescents between the ages of 19-23 years attended concerts more frequently than those younger than 16 years. This is consistent with Meyer-Bisch’s (1996) results indicating that the highest proportion of attendees to concerts are those between 21 to 22 years of age. The current study suggested that those aged 18 to 20 years were more likely to show a higher attendance to music concerts and festivals, greater exposure to the loud levels of noise, and less compliance to hearing protection. Therefore, the age group 18 to 20 years, according to the present study, probably indicates greater risk in terms of the potential damage to the auditory system. This is a similar finding to that of previous research regarding recreational noise and frequency of exposure (Mercier & Hohmann, 2002).

Furthermore, significant age-related differences were found with respect to the prevalence of tinnitus and noise sensitivity experienced following loud recreational noise played at concerts, with older adolescents reporting hearing related symptoms to a greater degree than the younger adolescents (Bohlin & Erlandsson, 2007). The current study found comparable results in terms of age and reported auditory difficulties. The age group that suggested higher risk perception results as well as sensitivity towards hearing problems related to loud noise was those in the oldest group.

The oldest age group identified in the survey reported greater sensitivity to *auditory-specific* symptoms including ear pain, ringing, difficulty hearing and awareness of the permanent nature of NIHL. This may be due to more life experience and the fact that once an individual is affected by a negative consequence through risk taking behaviour it might affect an individual's perception of vulnerability (Widen & Erlandsson, 2007).

Education

Another aspect related to the age of an individual is the level of education. Similar results regarding risk perception were found across the different education levels. Although education did not show any significant differences with regards to the *global* and *auditory-specific* risk perception, those with degree qualifications suggested greater *general* risk. Moreover, those in Matric were more likely to show greater risk in terms of *hearing protection strategies*. These individuals would fall within the age group that was most likely to demonstrate greater *general* risk as well as less likeliness to comply with *hearing protection strategies* (18 to 20 years old). This group might be described as one in a transition period in which the end of their schooling and uncertainty of their future may affect their perception of reality and their attitudes towards what may or may not be considered risky (Ellsworth, 1999).

Research regarding the parts of the teenager's brain; involved in keeping emotional, impulsive responses in check are still reaching maturity until their early twenties. This biological viewpoint may provide insight into this education level and age groups' youthful appetite for novelty, and a tendency to act on impulse without regard for risk. However, it is not yet possible to know to what extent a particular risk perception or behaviour is the result of a feature of brain structure or a change in brain structure. Changes in the brain take place in the context of many other factors, among them type of education, inborn traits, personal history, family, friends, community, and culture (The Teen Brain, accessed 10-07-2014).

Age and education are associated biologically and socially (The Teen Brain, accessed 10-07-2014). It has been stated that healthy behaviours are more easily established during early childhood compared to adulthood. Therefore it is important to note that the educational and social environment in which an individual spends majority of their time is significantly responsible in health promotion during childhood (Taljaard et al., 2013).

Taljaard et al. (2013) conducted a survey with 318 school aged children resulting in findings that suggest a positive change in knowledge about hearing and listening behaviour occurred in participants after a hearing loss prevention program. Participants became more alert to which sounds can cause damage and were able to offer practical prevention strategies to decrease the noise (Taljaard et al., 2013). Thus it is not only the level of education but the quality and content of the education and social environment that is of importance.

It was however, earlier established by Weichbold and Zorowka (2003), that the introduction about the risks of loud music is insufficient to change behaviour. Auditory symptoms may be a more important factor than provision of information to change the perceptions and attitudes and therefore the behaviour of young people (Widen et al., 2009). Education in the form of information as well as practical simulations of a hearing loss may be more powerful.

In the present study it was suggested that the majority of young people who would consider making use of hearing protection were those concerned about their own hearing. This is an important factor in helping to determine a way to influence young people's preparedness to take risks in order to influence their actual behaviour in an improved direction (Landalv et al., 2013).

Socio-economic status

Socioeconomic status (SES) was analysed in terms of employment and income status. According to Olsen-Widen and Erlandsson (2004), an individual's SES is connected to their attitudes towards noise associated with amplified music at concerts. Furthermore, it was concluded that an individual with a lower SES tends to have more tolerant attitudes towards noise and these individuals are less likely to wear hearing protection (Olsen-Widen & Erlandsson, 2004).

In the current study it was suggested that homemakers were more likely to show greater tolerance for loud music and greater *global* and *general* risk. Homemakers were closely followed by those who were unemployed and those who reported part-time employment with regards to perceptions about *hearing protection strategies*. The income group that suggested more likeliness for risk was those who didn't know their level of income. Therefore one can deduce that it is probably those who do not have full time employment and individuals who do not know their income status that present with greater tendencies for risk. These results are similar to the results obtained by Olsen-Widen and Erlandsson (2004).

These findings suggest that there is a difference in risk perception among young people with different levels of SES, which may result in future differences in actual hearing health, this is consistent with previous findings on SES and health risk behaviour (Olsen-Widen & Erlandsson, 2004). Earlier studies indicate the presence of a pattern in which individuals from a lower SES have a greater propensity to engage in negative health risk behaviour, and most confirm the hypothesis that individuals from groups with lower SES generally have more health problems than those with a higher SES (Graham, 1994; Haan, Kaplan & Syme 1989; Backlund, Sorlie & Johnson, 1996, Olsen-Widen & Erlandsson, 2004). When SES increases, risk factors and prevalence of disorders including audiological problems appear to decrease. However, this relationship may change due to increased age, as SES seems to have a greater effect on the younger population (Chen, Boyce & Matthews, 2002).

Nonetheless, socioeconomic differences in adolescence may be an important predictor to SES-related health outcomes in adulthood, such as NIHL as a result from exposure to loud recreational noise without the use of hearing protection (Rabinowitz, 2000). Therefore SES as a variable related to risk perception and the use of hearing protection is important, since the differences between SES groups, such as that suggested by the current study, longitudinally may result in SES-related differences in future auditory health (Olsen-Widen & Erlandsson, 2004). SES is associated with both attitude and behaviour therefore it is an important variable to include for preventative work regarding risk behaviour and recreational noise.

The findings regarding SES' influence on the risk perception of *auditory-specific* problems from amplified music; were similar to those obtained for *global* and *general* risk perception, with the homemakers and those who do not know their income status suggesting greater risk. Moreover it included the below average income group. Reinforcing the consensus among the results obtained in the present study as well as previous studies, that it is probable that the lower the socioeconomic group the greater the risk. The differences in terms of position in society will greatly affect preventative work, which should aim to not only change the individual's attitude towards health-risk behaviour but also include work on societal norms and regulations (Widen & Erlandsson, 2007). However, no significant differences were seen regarding the influence of SES on the perception of *hearing protection strategies.*

There is evidence that younger individuals may be easily influenced by their peers' and social norms, and if society considers it normal to stay in a noisy setting, individuals have a greater tendency to act accordingly (Widen &

Erlandsson, 2007). Social norm theory states that how an individual perceives other members of their social group behaves, regardless of whether it is correct or not, influences one's own behaviour (Widen & Erlandsson, 2007). This theory would suggest that if the belief is that amplified music exposure without hearing protection use is an acceptable norm, regardless of the accuracy, they will participate in the risky behaviour. Furthermore 'group pressure' will result in an individual's perceptions being influenced by those of others (Widen & Erlandsson, 2007: p. 42).

Misperceptions of social norms relating to listening behaviour may decrease an individual's perceptions of susceptibility to hearing damage (Gilliver et al., 2012). Significant differences were found in a recent study by Gilliver et al. (2012), between self-report and estimation of peers' listening levels, nearly half (46%) of participants believed that their peers listened at risky levels. These differences have the potential to reduce perceptions of personal vulnerability and motivation to change personal listening behaviours. In addition there is a probability that this may lead to individuals emulation of peer behaviour in order to meet the perceived social norm (Gilliver et al., 2012). Nevertheless, the findings in this study suggest that 'peer pressure' had the least influence on attendees willingness to wear hearing protection but rather that the law, expense and comfort were the top three influential factors.

Findings from a study by Chesky, Pair, Lanford and Yoshimura (2009: p. 52) regarding attitudes of young people in relation to 'youth culture', indicate that students' attitudes toward influencing their sound environments are positively correlated with attitudes towards noise in the youth culture. Therefore their attitudes towards carrying out a risk such as reducing negative attitudes towards noise associated with youth culture, reported avoidance of such exposures if perceived as too loud or unsafe.

According to Widen and Erlandsson (2007: p. 41), music can be used as a means for creating an identity in modern youth culture. "Music as a mean in creating identity", can be described with three conceptually related higher-order categories, "self-image", "risk consideration", and "norms and ideals", in order to understand risk-taking behaviour in musical settings such as concerts and festivals. Self-image may be as a result of an interaction between the individual, social norms and existing normative ideals held by a peer group. Identity creation by means of music can involve some health risks, for example, listening to loud music, and an individual's risk consideration or perception can be seen as the result of the interaction between self-image, social norms and ideals. If an individual's self-image is that they are invulnerable to loud music there will be no discrepancy between this and the normative ideal of loud music being played at concerts or festivals. This would result in the individual perceiving the environment or activity less risky (Widen & Erlandsson, 2007).

This reasoning is consistent with the theory of the "Health Belief Model" which can be applied to NIHL. According to this model the likelihood that young adults will take preventative actions, such as, decrease noise exposure or make use of hearing protection, will depend on the individual's perceptions about NIHL (Rawool & Collington-Wayne, 2008: p. 3). These individual perceptions include personal vulnerability (related to gender, peers and society), previous experiences with auditory symptoms, and barriers to use of hearing protection devices (Rawool & Collington-Wayne, 2008: p. 3).

5.4. Conclusion

Chapter five discussed the findings regarding the risk perception of young South Africans towards amplified music at concerts and festivals. The results of the present study yielded similar findings for *global* and *general* risk perceptions, as well as for perceptions towards *hearing protection strategies*. These results along with those obtained for *auditory-specific* risk perceptions were described in terms of the influence of the participant's demographics; gender, age, education, and socio-economic status. The influence of these demographics of the young people attending the music events, were compared to the risk perceptions regarding recreational noise at the five live music events and these relationships were discussed in the context of previous research findings.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1. Introduction

The purpose of this study was to explore and understand young people's risk perceptions towards amplified music at music concerts and festivals in South Africa. The results showed that gender, age, education and socioeconomic factors are all influential on how young people perceive risk in terms of recreational noise at these music events. The findings will be presented in the conclusion section of this study and can be used to assist in the development of contextually-appropriate awareness campaigns regarding recreational noise, initiation of hearing health risk prevention strategies and support the development and advancement of effective intervention methods such as decreasing noise levels at recreational music events as well as improving compliance to hearing protection strategies at music shows in South Africa.

6.2. Conclusions

Evidence from the risk-perception survey in this study suggests that there was a significant influence of certain demographic variables on *global* and *general* risk perception of recreational noise as well as perceptions regarding recreational hearing loss *preventative strategies*.

Firstly, the influence of gender suggested a significant influence on the perceptions of young people with regards to their *global* and *general* risk perceptions. The findings concluded that gender identification may play an important role in risk perception (Bohlin & Erlandsson, 2007). This is not only limited to risk perception but correspondingly to risk taking behaviour regarding the level of noise exposure, frequency of attendance and choice of leisure time activities (Jokitulppo et al., 1997; Widen et al., 2006).

Furthermore there is evidence that suggests significant gender differences regarding attitudes towards *hearing protective* behaviour (Widen et al., 2006; Bohlin & Erlandsson, 2007). Research has shown that men and women expect to fit into specific gender norms and the social ideal that women are more sensitive and vulnerable results in men portraying themselves as the more precarious gender (Bohlin & Erlandsson, 2007; Gullone & Moore, 2000). The findings in this study make similar suggestions with men probably showing more tendencies for hearing health risk than women.

Secondly the age group that suggested that they were most likely to present with the greatest *global* and *general* risk, as well as risk regarding *hearing protective strategies* was those between 18 to 20 years of age. Age is influenced by the individual's level of maturation, experience and responsibility and certain activities such as music concerts or festivals may provide various privileges to younger people, such as a perceived freedom. Moreover, they view situations that may be deemed risky as an opportunity to mature or gain experience (Widen & Erlandsson, 2007).

This finding correlated with the influence of level of education, with Matric students suggesting the highest level of *global* risk. This age group corresponds with the age groups found in earlier studies, to present with higher frequency of attendance to concerts (Meyer-Bisch, 1996; West & Evans, 1990). Moreover, according to literature younger people tend to be more pro-risk and behave in a riskier manner (Bohlin, Sorbring & Erlandsson, 2010). The education level itself, did not show a significant influence on the g*lobal* risk perceptions of young people. However, these young people may be in a transition period in their lives, in which they may be more open-minded to exploring riskier experiences and situations. In addition an individual's educational and social environment is closely related (Taljaard et al., 2013), therefore their cultural background and socio-economic group may also be influential.

Lastly, the influence of socio-economic status (SES) was explored in terms of employment and income status. Those who did not have full-time employment; the homemakers and those employed part-time, as well as those who were unaware of their income status were grouped into a lower SES group. This group showed the most likelihood of a greater tolerance for loud music, as well as the greatest *global* risk perception. There is a pattern in which those from a lower SES have a greater propensity to engage in negative health behaviour and therefore experience more health problems than those from a higher SES group. SES is associated with risk perception and attitudes which directly influence how the individual behaves (Olsen-Widen & Erlandsson, 2004), consequently this may result in future differences in actual auditory health. SES is associated with both attitude and behaviour, therefore it was an important variable to consider (Olsen-Widen & Erlandsson, 2004).

With regards to the influence of SES on *auditory-specific* risk perceptions, the results were similar to the other areas of investigation, in addition it included the below average income group. This reinforced the consensus among the results suggested in the present study as well as in the literature, that it is a possibility that the lower the socioeconomic group the greater the risk. These differences in terms of SES will affect hearing health preventative strategies, which should aim to not only change the individual's attitude towards health risk behaviour but also include work on societal norms and regulations (Widen & Erlandsson, 2007).

Reasoning consistent with Rawool and Colligon-Wayne's (2008: p. 3-4), 'health belief model' can be applied to recreational noise induced hearing loss (NIHL), in which the probability that young people will comply with risk prevention strategies will be contingent on the individual's risk perceptions about recreational noise and its consequences. These perceptions are related to that individual's personal vulnerability relative to peers and gender; experiences with auditory symptoms and lastly perceived barriers to the use of hearing protection; all of which were explored in this investigation.

The results regarding the risk perception of young people in terms of *auditory-specific* problems caused by excessive recreational noise exposure indicated that gender and level of education showed no significant differences. However, the influence of age was quite contradictory to that found for *global*, *general* and *hearing protection* risk perceptions, indicating that the older age group was more likely to show greater concern. The age group that suggested the highest risk towards potential *auditory-specific* problems was the oldest age group in the study and according to literature this may be as a direct result of life experiences, maturation and previous negative experiences (Widen & Erlandsson, 2007). Evidence shows that an individual negatively affected by a risky behaviour results in an action that may increase the probability for changing the risk behaviour into a more health-oriented behaviour (Widen & Erlandsson, 2007). Thus perceived consequences of an auditory impairment, such as, tinnitus or hearing loss seem to promote compliance with hearing loss preventative measures (Olsen-Widen & Erlandsson, 2004).

The conclusions drawn in this investigation highlight the possibility that women, older age groups, and those from a higher SES group were more likely to identify themselves as possibly more vulnerable and susceptible to auditory symptoms in comparison to the men, younger age groups and those from a lower SES group. This can be explained from the view that individual's with greater awareness or previous negative experiences perceive themselves as more vulnerable to noise exposure. This view is supported by evidence in the literature that states that concern about hearing is related to willingness to use hearing protection at concerts (Bogoch et al., 2005; Olsen-Widen & Erlandsson, 2004b).

Barriers to hearing protection were explored in terms of the reasons why young people would start wearing earplugs and the reasons why they would wear them if provided at the music concerts and festivals. The findings suggested that the majority would wear earplugs if they were concerned about their own hearing. This is consistent with the evidence that negative consequences have a greater impact on changing health-oriented behaviour (Bogoch et al., 2005). Furthermore the results indicated that the majority of attendees to music concerts and festivals would wear earplugs if a law was passed. This substantiates that if hearing protection was a legal requirement, the majority of young people would possibly show greater compliance.

In the occupational setting, the sound exposure limits for International Occupational Health and Safety regulations and damage risk criteria used in South Africa (OHS, 1993; NIOSH, 1998), state that "prolonged exposure to equivalent levels more than and equal to 85dBA during 40 hours per week or 8 hours per day" require that individuals make use of hearing protection. The sound levels, Lex 8h (dBA), measured at these events for descriptive purposes indicated that the majority of the music concerts and festivals show that the attendees are at risk for possible auditory damage dependent on the frequency and duration of their attendance.

However, further research is necessary in order to provide statistically significant measurements as well as to evaluate the durations of these particular recreational activities, since music concerts generally take place over one night whereas music festivals take place over a few days. This is an important factor in determining effective and accurate damage risk criteria and hearing health risk regulations in these recreational settings.

6.3. Clinical implications

The current study was the first of its kind to conduct a survey of young people's perceptions towards recreational noise at music concerts and festivals in South Africa. It subsequently provided crucial information regarding the influence of gender, age, education, and socio-economic status on the risk perceptions of this recreational noise. This is essential contextually relevant information necessary to develop and initiate awareness campaigns directed at reducing the risk of recreational hearing loss among young people in South Africa. By identifying characteristics that influence the risk perception of young people, it is possible to change health risk behaviour by making use of a cultural and social framework as suggested by Bohlin and Erlandsson (2007).

Awareness campaigns aimed at improving knowledge and perceptions about the risk of recreational noise at music events need to focus on a specific population. This study provided information regarding the influence of certain demographics on the perception of this risk. The study suggested that the demographics of the population that possibly show greater propensity for risk are males, those aged 18 to 20 years, in Matric or during their early years post Matric. Furthermore these campaigns may need to include homemakers and individuals from a lower income group.

Women, the older age group, and those from a higher SES possibly perceive themselves as more vulnerable to recreational noise and may therefore be at less risk to the adverse effects of recreational noise. On the other hand, men, those within the age group 18 to 20 years, and those who are from a lower SES may perceive themselves as invulnerable to negative consequences. Thus making provision of information or improving awareness regarding the risks of recreational noise a more complicated task in order to successfully change their behaviour.

Previous studies show that although provision of information and education are often regarded as health promoting variables, provision of contextually and culturally appropriate information alone will not be sufficient to change risky behaviour. Weichbold and Zorowka (2003) found that hearing education campaigns promoting hearing protection strategies among young people showed minimal improvement in rate of compliance hence other variables need to be considered.

The variables of “self-image, social norms and ideals”, as per Widen and Erlandsson (2007: p. 42) need to be integrated in health preventative work in order to change risk behaviour. An individual’s self-identification as being vulnerable to negative consequences of risk behaviour, is central in transforming this behaviour (Widen & Erlandsson, 2007). As previously mentioned changing health risk behaviour is a complicated task, hence risk perceptions need to be investigated with a systems theoretical point of view in mind, in which more than the individual’s perceptions need to be analysed.

A whole system of interrelated variables, including peer norms, cultural values, laws and regulations, need to be taken into account (Widen et al., 2009; Rawool, 2012). In addition, hearing protection strategies should aim at changing the individual's perceptions and attitudes as well as societal norms and regulations, in order to decrease noise-induced auditory symptoms among young people (Landalv et al., 2013).

The findings in this study may assist in provision of justification for new legislation towards the prevention of excessive recreational noise and the use of hearing protection devices, as the majority of young South Africans attending music concerts and festivals would only wear hearing protection in the form of earplugs if it became a legal requirement. Apart from legal regulations, several strategies for reducing noise exposure at music venues should be explored. This could include development and implementation of evidence-based guidelines, safety standards for lowering sound levels to safe limits at music venues, acoustic treatment of venues, surround sound options, provision of free ear plugs and a display of sound levels on big screens (Rawool, 2012). According to Landalv et al. (2013) a combination of different approaches may be more successful than a single strategy.

6.4. Critical evaluation

A critical evaluation of the research project is crucial in order to interpret the findings of the research within the framework of strengths and limitations. These are discussed below:

6.4.1. Strengths of the study

The current study rendered imperative information with regards to the *global* risk perceptions of recreational noise at these events, as well as the *general* risk perceptions in terms of the loudness of the amplified music and the frequency of attendance, the perceptions towards consequential *auditory-specific* symptoms, along with the perceptions towards *hearing protection strategies*.

Apart from research regarding sound pressure levels of the vuvuzela (Swanepoel et al., 2010), South Africa has no existing systematic data regarding the effects of or perceptions towards recreational noise. This research project attempted to address a shortage of contextually relevant information regarding recreational hearing loss, which is lacking in South Africa and in most developing countries (WHO, 1997).

This investigation provided valuable information regarding risk perception of recreational noise relevant to the South African population in a culturally appropriate manner; which may be used to increase awareness of recreational hearing loss, moreover assist in the development of effective intervention methods such as hearing awareness campaigns. In addition, it emphasized the need for further inquiry into new regulations and legislation in terms of NIHL outside of the occupational setting, towards the prevention of excessive recreational noise and NIHL in a younger population.

This study demonstrates and advocates the need and value for further exploration of risk perceptions. The individual's risk perceptions about recreational noise and its consequences were explored in order to determine personal vulnerability relative to peers and gender, their previous experiences with auditory symptoms and lastly their perceived barriers to the use of hearing protection. These are critical factors in the development of efficient and successful hearing health risk prevention programs.

Nonetheless, the following limitations of the study were identified and have to be taken into consideration during the interpretation of results and the planning of future research.

6.4.2. Limitations of the study

Risk of hearing loss from recreational noise is dependent on individual genetic vulnerability, duration of exposure and sound intensity (Sahdra et al., 2002). However, these factors were inadequately accounted for in this study.

Dosimetry measurements were conducted at each event but due to technical and logistical difficulties the total number and duration of measurements taken was insufficient to be statistically conclusive. Furthermore the time period in which the data needed to be collected did not allow for additional testing and the sound level measurements obtained were only plausible in terms of descriptive information.

Moreover, an attempt to limit the length of the questionnaire in order to ensure speedy completion, avoid fatigue and improve the response rate due to the nature of the loud and social environment at the music concerts and festivals, resulted in limited factors relating to hearing risk perception being explored in the current study.

The music venues where the questionnaires were completed were mainly attended by Caucasian South Africans, due to the genre of music being 'pop/rock', therefore generalizations to the multitude of cultural groups in South Africa could not be drawn. The questionnaire was made available in two South African languages (English and Afrikaans), despite the fact that there are eleven official languages.

Recreational hearing loss similar to all types of sensorineural hearing loss is invisible. It does not affect physical appearance, has an insidious onset and may not be perceived as a disability in its early stages. This contributes to the lack of concern shown by young people in reducing their risk to amplified music (Rawool & Colligon-Wayne, 2008: p. 9-10). This resulted in lack of interest in the risk-perception survey at these events although the required sample size was reached.

6.5. Recommendations for future research

The findings of this study created potential for future research on a number of aspects:

Further research is necessary regarding the sound levels of amplified music at these events in order to provide epidemiological data for the development of damage risk criteria and justification for new regulations and legislation towards the prevention of excessive recreational noise and NIHL in the younger population. A greater number of measurements of continuous sound pressure levels as well as the duration of exposure will assist in determining the level of risk present at South African concerts and festivals.

Moreover, the effect on the auditory system of young people attending these events will facilitate the motivation and justification for the implementation and adaptation of standards and guidelines regarding excessive noise in the recreational setting.

Further longitudinal research projects should be conducted throughout South Africa exploring the levels of recreational noise as well as the risk perception of young people attending a wider variety of recreational activities in which amplified music reaches excessive levels. Evidence shows that the exposure to recreational noise continues to rise (Sliwinska-Kowalska & Davis, 2012) and different sources of this recreational noise should be investigated in the South African context.

Although this research was conducted in four different provinces in South Africa, future studies are necessary to allow for generalizations to larger groups including culturally and geographically diverse groups attending concerts and festivals of different music genres.

Exploration of unique and innovative options for creating awareness and preventing hearing loss in a younger population is necessary; such as the provision of experience with simulated hearing losses, as a strategy to promote the use of hearing protection, the effectiveness of cosmetically appealing hearing protection devices in order to acquire maximum compliance, and interactive computer games or android applications which measure sound output levels at music concerts and festivals.

Further research regarding the competency and efficacy of preventative strategies to reduce recreational noise exposure at music venues is necessary. In addition, it is essential to expand and develop innovative theoretical and empirical tools in the analysis of risk taking and continue to monitor the effectiveness of all hearing health care programs and initiatives.

6.6. Final comments

There is a dire need for promoting healthy hearing behaviour among young people. This behaviour is significantly influenced by an individual's risk perception which may be determined by their personal vulnerability, their experiences and their perceived barriers to the required behaviour or outcome.

Personal vulnerability is mainly related to gender and age, with females and the older population probably perceiving greater vulnerability than men and younger population. Moreover age, level of education and socio-economic status (SES) affect an individual's life experiences and influences their perceptions regarding barriers towards compliance with hearing protection strategies, with the younger in age, lower education level, as well as the lower SES groups probably indicating less willingness to comply. Furthermore, concern about one's own hearing, and awareness of other auditory problems, are generally associated with greater compliance to hearing protection.

It was important to take societal and existential dimensions into account in this risk perception and behaviour research in the South African context, in order to re-conceptualize stereotypical ideas about the influence of demographic aspects including, gender, age, class and culture (Bohlin et al., 2011).

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APPENDIX A

LETTER OF ETHICAL CLEARANCE FROM RESEARCH ETHICS COMMITTEE

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Office of the Deputy Dean

7 March 2013

Dear Prof Vinck

Project:	**The risk-perception and levels of amplified music at music concerts and festivals in South Africa**
Researcher:	**NT Almec**
Supervisor:	**Prof B Vinck**
Department:	**Communication Pathology**
Reference number:	**24086526**

I am pleased to be able to tell you that the above application was **approved (with comment)** by the **Postgraduate Committee** on 12 February 2013 and by the **Research Ethics Committee** on 28 February 2013. Data collection may therefore commence.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. Should the actual research depart significantly from the proposed research, it will be necessary to apply for a new research approval and ethical clearance.

The Committee requests you to convey this approval to the researcher.

We wish you success with the project.

Sincerely

Prof Sakhela Buhlungu
Chair: Postgraduate Committee &
Research Ethics Committee
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail: sakhela.buhlungu@up.ac.za

APPENDIX B

PARTICIPANT LETTER OF INFORMED CONSENT

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Denkleiers • Leading Minds • Dikgopolo tša Dihlalefi

Faculty of Humanities
Department of Speech-Language Pathology and Audiology

Letter of Informed Consent

You are being invited to take part in a research study. Before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. Please take the time to read the following information carefully. Please ask the researcher if there is anything that is not clear of if you need more information.

<u>Investigators</u>

Name: Nizha Almec B. Communication Pathology

University of Pretoria: Department of Speech-Language Pathology and Audiology.

Supervisors:

Prof. B. Vinck (Head of Department of Speech-Language Pathology and Audiology)

Dr L. Pottas (Senior Lecturer)

Contact no: 012 420 2357 / 013 750 1349

<u>Purpose of the research</u>

The purpose of this study is to investigate the risk perceptions of young people to amplified music at music concerts and festivals in South Africa. This research will provide further insight into the cause of recreational hearing loss in the unique South African context. This study is being completed for qualification in a M. Communication Pathology degree.

<u>Procedures</u>

If you volunteer to participate in this study, you will be asked to complete 20 questions regarding noise and hearing. Please answer as honestly as possible. The questionnaire will be completed anonymously. Your expected time for participation will take approximately 10 minutes.

Potential risks or discomforts

There are no foreseeable risks associated with this study. There may be risks that are not anticipated however every effort will be made to minimize these. Should participation in this study result in discomfort and unease regarding the questions, please feel free to decline to answer.

Potential benefits of the research

There is no monetary compensation to anyone for your participation in this study. This research will be valuable since it will contribute to the provision of contextually relevant information regarding recreational hearing loss, which is lacking in most developing countries. It will increase awareness of recreational hearing loss which is a potentially debilitating condition almost entirely preventable.

Confidentiality and data storage

The participants have a right to remain anonymous. This right will be respected consistently. Confidentiality of the respondents will be maintained throughout the study and each respondent and music event will be provided with a numerical value when results are recorded. The names of the respondents will not be recorded and the names of the events will not be made available to other parties and will be excluded from the study. Information from this research will be used solely for the purpose of this study and any publications that may result from this study. The data will be stored in the Department of Speech-Language Pathology and Audiology at the University of Pretoria for 15 years. Only the researcher and supervisors will have access to the data and confidentiality will be respected in discussing and sharing of results.

Participation and withdrawal

Your participation in this research study is voluntary. You may refuse to participate or stop participation at anytime without penalty. No incomplete surveys will be included in the survey. Therefore, to stop participating do not complete the questionnaire, tell the researcher you wish to withdraw or do not hand in your questionnaire.

Questions about the research

If you have any questions about the research, you may contact Nizha Almec at 013 750 1349.

I have read the information provided above. I understand that by signing and returning a completed questionnaire, I am agreeing to participate in this research study.

Kind regards

Student: Nizha Almec

Dr Lidia Pottas
Senior Lecturer: Audiology

Prof Bart Vinck
HEAD: Dept. of Speech-Language Pathology and Audiology

APPENDIX C

ENGLISH RISK-PERCEPTION SURVEY

Do you give informed consent to participate anonymously in this research project (M. communication Pathology University of Pretoria)			Yes (sign)	No				
SECTION A: Demographic								
Gender	M	F						
Age	18-20	21-24	25-30	<18	>30			
Highest level of eduction	Matric	Certificate	Diploma	Degree	Post graduate			
Employment status	Student	Part time	Full time	Unemployed	Homemaker	Other		
Estimated family income	Above average	Average	Below average	Don't know	Prefer not to answer			
SECTION B: General Perception								
In your opinion are live music concerts excessively loud?	Yes	No	Unsure					
In your opinion are music festivals excessively loud?	Yes	No	Unsure					
Would you still attend a live music show if the volume was lowered?	Yes	No	Unsure					
How often have you attended any live music shows in the past 6 months?	very frequently (>6 times)	frequently (3-6 times)	not often (<6 times)					
SECTION C: Risk-Perception								
Have you ever experienced any type of hearing related problem (ear pain, ringing, difficulty hearing)	Yes	No	Unsure					
How frequently have you experienced hearing-related problems during/after listening to loud music?	very frequently	frequently	not often					
Do you think there is a cure for a hearing loss?	Yes	No	Unsure					
In your opinion could limited exposure to excessive loud noise cause permanent damage?	Yes	No	Unsure					
SECTION D: Intervention -Hearing Protection								
Have you ever worn earplugs in the presence of loud music?	Yes	No	Unsure					
Has it ever been suggested to you that hearing protection would be a good idea?	Yes	No	Unsure					
If yes, by who?	Friend	Parent	Teacher	Docter/Nurse	Audiologist	Media	Other	
If you do wear earplugs, why did you start wearing them?	I don't	worried about my hearing	already have a hearing loss	the music is just too loud	my ears ring	my ears hurt	since the soccer world cup 2010	other
Would you wear hearing protection if it was recommended by a health professional?	Yes	No	Unsure					
Where would you go to buy earplugs?	Grocery store	Clinic	Pharmacy	Docter/Nurse	Audiologist	Hearing Aid store	Online/ Internet	I don't care
Would you wear hearing protection if it was provided at the venue? (Can choose more than one)	if it is law	if it is cheap	only if its free	if everyone does	if they are comfortable			

APPENDIX D

AFRIKAANS RISK-PERCEPTION SURVEY

Gee u hiermee toestemming om deel te neem aan hierdie navorsingsprojek (M. kommunikasiepatologie, Universiteit van Pretoria)			Ja (teken)	Nee				
Afdeling A: Demografie								
Geslag	M	V						
Ouderdom	18-20	21-24	25-30	<18	>30			
Hoogste kwalifikasie behaal	Matriek	Sertifikaat	Diploma	Graad	Nagraads			
Beroepstatus	Student	Deeltyds	Voltyds	Werkloos	Tuisteskepper	Ander		
Beraamde gesinsinkomste	Bogemiddeld	Gemiddeld	Ondergemidd eld	Onseker	Verkies om nie te antwoord			
Afdeling B: Algemene persepsie								
Is musiek by regstreekse musiekkonserte oormatig hard, in u opinie?	Ja	Nee	Onseker					
Is musiek by musiekfeeste oormatig hard, in u opinie?	Ja	Nee	Onseker					
Sou u steeds regstreekse musiekkonserte bywoon indien die volume verlaag word?	Ja	Nee	Onseker					
Hoe gereeld het u in die afgelope 6 maande musiekkonserte bygewoon?	Baie gereeld (>6 keer)	gereeld (3-6 keer)	Nie gereeld nie (<6 keer)					
Afdeling C: Persepsie van persoonlike risiko								
Het u al ooit enige gehoorprobleme ondervind? (oorpyn, gesing in die ore, gehoorverlies)	Ja	Nee	Onseker					
Hoe gereeld het u al gehoorprobleme tydens, of na afloop van, blootstelling aan harde musiek ervaar?	Baie gereeld	gereeld	Nie gereeld					
Is u van mening dat gehoorverlies geneesbaar is?	Ja	Nee	Onseker					
Is u van mening dat beperkte blootstelling aan oormatige geraas permanente skade kan aanrig?	Ja	Nee	Onseker					
Afdeling D: Intervensie/ Gehoorbeskerming								
Het u al ooit oorproppies gedra in die teenwoordigheid van harde musiek?	Ja	Nee	Onseker					
Het iemand al ooit voorgestel dat u van gehoorbeskerming gebruik moet maak?	Ja	Nee	Onseker					
Indien wel, deur wie?	Vriend	Ouer	Onderwyser	Dokter/ verpleegster	Oudioloog	Pers	Ander	
Indien u wel oorproppies dra, dui asseblief aan wanneer u dit begin gebruik het.	Onseker	Bekommerd oor gehoor	Het reeds gehoorverlies	musiek is net te hard	My ore sing	My ore is seer	Vanaf sokker wêreldbeker 2010 Ander	ander
Sou u van gehoorbeskerming gebruik maak indien dit deur mediese personeel voorgestel word?	Ja	Nee	Onseker					
Waar sou u oorproppies gaan aankoop?	Supermark	Kliniek	Apteek	Dokter/ verpleegster	Oudioloog	Gehoorappar aatverskaffer	Internet	Gee nie om nie
Sou u van gehoorbeskerming gebruik maak indien dit by die onderskeie funksies beskikbaar gestel word? (kan meer as een kies)	As dit is die wet	Indien dit goedkoop is	Slegs as dit gratis is	indien almal dit gebruik	Indien dit gemaklik is			