MENTAL HEALTH FACTORS AND INTELLIGENCE AMONG DEAF AND HARD OF HEARING INDIVIDUALS

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Submitted

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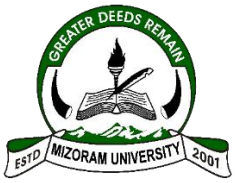

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CERTIFICATE

This is to certify that the present research work titled, **"Mental Health Factors and Intelligence among Deaf and Hard of Hearing Individuals"** is the original research work carried out by Mr. Laltanpuia Chhangte under my supervision. The work done is being submitted for the Award of the degree of Doctor of Philosophy in Psychology of Mizoram University.

This is to further certify that the research conducted by Mr. Laltanpuia Chhangte has not been submitted in support of an application to this or any other University or an Institute of Learning.

August, 2021

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DECLARATION

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August, 2022

I, Laltanpuia Chhangte, hereby declare that the subject matter of this thesis is the record of work done by me, and that the contents of this thesis did not form the basis of the award of any previous degree to me or to the best of my knowledge to anybody else, and that the thesis has not been submitted by me for any research degree in any other University/ Institution.

This is being submitted to the Mizoram University for the degree of Doctor of Philosophy in Psychology.

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INTRODUCTION

Mental health is an important and necessary part of health and wellbeing. The absence of mental illness is not what mental health meant as it also included the effective functioning of an individual for their well-being, and the prevention, treatment and rehabilitation of mental disorders (WHO, 2021). In 2015, the global prevalence of common mental illnesses such as depression and anxiety disorders are estimated at 5.5% and 3.6%, respectively; suicide accounts for 1.5% of global deaths in the same year (WHO, 2017). The burden of mental health problems in India as estimated by the World Health Organisation (WHO, 2021) was 2443 disability-adjusted life years (DALYs) per 10000 population and the age-adjusted suicide rate was 21.1per 100000 population. According to a 2017 World Health Organisation (WHO) Report, major or minor mental illnesses that require expert intervention are reported for 7.5 per cent of India's population (Iyer, 2017). It was also estimated that the economic loss that could arise because of mental health conditions during 2012-2030 was USD 1.03 trillion (WHO, 2021). Although the causes of mental disorders are known to be largely influenced by biological factors, socioeconomic and environmental factors; and individuals, families, communities, societies and populations at large could be affected by mental health conditions, attention was not given enough to its prevention and treatment (Chaudhury et al., 2015; Gottschalk & Domschke, 2016).

One of the most common, chronic and disabling health conditions is mental health disorders globally. The global burden of Disease (2010) estimated that 400 million people worldwide suffered from depression, 272 million from anxiety disorders and 24 million from schizophrenia (Ferrari et al., 2013). Depression has been recognised as the single largest contributor to years lived with disability globally (WHO, 2016). Many people may have not undergone an authentic / clinically diagnosed with a mental disorder but are suffering from bad mental health conditions. WHO (2004) also mentioned that this untreated widespread occurrence of mental health problems leads to impairments in their performance. As such, approximately 60 million people in India are suffering from mental health problems, and about 90 per cent did not receive any treatment (Sharma, 2017). Available works of the literature suggested that mental illness affected days out of work, loss of productivity, financial drain from treatment costs, family and caregiver stress and

loss of life (Bronsard et al., 2016; Centers for Disease Control and Prevention, 2011).

Several factors including biological, psychological and social factors may determine the level of mental health and the prevention of mental disorders. Individual or personal attributes such as the ability to manage one's emotions, thoughts, behaviours and interactions with others are not the only determinants of mental health but also include social, economic, cultural, political and environmental factors such as national policies, social protection, living standards, working conditions and family and community social support (WHO, 2020).

It was evinced that individuals who are deaf and hard of hearing (DHH) are more prone to mental health problems but the availability of mental health services for the deaf and hard of hearing is still meagre and very deprived. The DHHs are isolated from the hearing world due to communication barriers and social factors leading to the high prevalence of mental health disorders among the deaf populations with evidence in several countries (Fellinger et al., 2012; Van Gent et al., 2007). Almost half of the deaf population have a mental health problem during their lifetime (Fellinger, Holzinger, Sattel, Laucht & Goldberg, 2009).

According to WHO (2020), over 5% of the world's population, i.e. 466 million people, has disabling hearing loss comprising 432 million adults and 34 million children. By 2050, WHO estimated that one in every ten people i.e. over 900 million people will have disabling hearing loss. The prevalence of disabling hearing loss is often underestimated because the estimation is hard to be done as the definition of disabling hearing loss differs by the convention used to measure or explain hearing loss (Castrogiovanni, 2008). WHO defined disabling hearing loss as hearing loss that is greater than 40 decibels (dB) in the better hearing ear in adults and a hearing loss greater than 30 dB in the better hearing ear in children (WHO, 2018). Approximately one-third of people over 65 years of age are affected by disabling hearing loss (WHO, 2020).

It was estimated that about half of childhood deafness occurs from birth (Action on Hearing Loss, 2011; Middleton, Emery & Turner, 2010; Morton & Nance, 2006), a critical period of communication learning and peer interaction during childhood, which highly determines the functional and social capabilities of a

deaf person (Mitchell, 2005), and also can occur in adulthood because of age-related declining which referred as ‘Late-deafened’. A visual mode of communication developed by deaf communities to communicate among themselves and others is called ‘Sign language’. Many people who are born deaf and who communicate mainly through sign language well accepted themselves as part of a distinct community with a common language and cultural heritage and, not as disabled (DOH, 2005).

Several factors contributed to the high prevalence of mental health problems in the deaf population, some are acquired or congenital which may lead to changes in brain development making them more vulnerable to mental health problems (Brown, Cohen, Greenwald & Susser, 2000; Middleton, Emery & Turner, 2010; Morton & Nance, 2006). Many deaf people faced not only hearing problems but also deaf-related problems such as neuro-developmental problems including Autism Spectrum Disorders (ASD), Attention Deficit Hyperactivity Disorder (ADHD), learning difficulties and visual and motor impairments. They are more prone to experiencing difficulties in cognitive functioning affecting or declining their well-being (DOH, 2005; Hindley, 2005). Research evinced that about 95% of deaf people were from hearing families or hearing parents who are not familiar with deafness or do not know sign language (Hindley, 2005; Meadow-Orlans & Erting, 2000; Horne & Pennington, 2010; Brauer, Braden, Pollard & Hardy-Braz, 1998) which impede communication ability. Further, these communication difficulties lead to social exclusion and limited interaction resulting in unstable emotional development (Hindley, 2000; 2005; Horne & Pennington, 2010; Brauer et al., 1998) that resulted in a limited understanding of other’s emotions, limited vocabulary, and consequential thinking (Gray, Hosie, Russell & Ormel, 2003; Hindley, 2005; Remmel, Bettrer & Weinberg, 2003). Those limitations also lowered self-esteem, and educational and employment opportunities which affected their mental health and wellbeing (Fellinger et al., 2009; Ridgeway, 1997).

Previous studies suggested that only a few deaf individuals who required mental health services had the opportunity to avail the services (Appleford, 2003; Pollard, 1993; Steinberg, 1991). Most deaf individuals go to mainstream hospitals and clinics for mental health services. There were numerous hindrances which included a lack of interpreters and mental health professionals without the

knowledge of sign language resulting in more severe mental health problems, misdiagnoses, “anti-therapeutic custodial isolation” and longer hospital stays (Vernon & Daigle-King, 1999; Vernon, 2006). Deaf people relied on their family, friends and community members who had no formal qualifications or training in the area of aiding mental health problems (Steinberg, Sullivan & Loew, 1998).

The present study tried to highlight the level of mental health and well-being faced by deaf and hard of hearing individuals in Mizoram, India and also compared the level of intelligence of the Deaf and Hard of Hearing (DHH) individuals with the hearing individuals in the adult population. Let us first look at the definition and terminology of the key terms used in this study.

Hearing Impairment

Hearing impairment is the inability to hear as clear as someone with normal hearing (WHO, 2017). Hearing-impaired people can be “hard of hearing” (HOH) or “deaf”. A person who is not able to hear distinctly as someone with normal hearing – hearing thresholds of 25 dB or better in both ears – is said to have hearing loss. Hearing loss may be mild (26-40 dB), moderate (41-60 dB), severe (61-80 dB), or profound (over 81 dB). It can affect one ear or both ears and leads to difficulty in hearing conversational speech or loud sounds (WHO, 2017).

The Rights of Person with Disabilities Act, 2016 has termed Hearing Impairment as ‘Deaf’ and ‘Hard of Hearing’, in which ‘deaf’ means persons having 70 DB hearing loss in speech frequencies in both ears; and "hard of hearing" means a person having 60 DB to 70 DB hearing loss in speech frequencies in both ears (Ministry of Law and Justice, 2016).

'Hard of hearing' refers to people with hearing loss ranging from mild to severe. People who are hard of hearing usually communicate through spoken language and can benefit from hearing aids, cochlear implants, and other assistive devices as well as captioning. People with more significant hearing losses may benefit from cochlear implants (WHO, 2017). 'Deaf' people mostly have profound hearing loss, which implies very little or no hearing. They often use sign language for communication (WHO, 2017).

Causes of hearing loss and deafness

There are two main causes of hearing loss and deafness which are categorized as *congenital causes* and *acquired causes*.

Congenital causes: A congenital factor of hearing loss appear at birth or is acquired soon after birth, it may be due to hereditary or non-hereditary genetic factors causing hearing loss or certain complications during pregnancy and childbirth such as maternal rubella, syphilis or certain other infections during pregnancy; low birth weight; birth asphyxia, inappropriate use of drugs during pregnancy (eg. aminoglycosides, cytotoxic drugs, antimalarial drugs, and diuretics), severe jaundice during the neonatal period which damages the hearing nerve in a new-born infant (WHO, 2017).

Acquired causes: *A*cquired hearing loss at any age due to infectious diseases including meningitis, measles and mumps, chronic ear infections, a collection of fluid in the ear (otitis media), use of certain medicines (malaria, tuberculosis, cancers), head or ear injury, bombard of excessive noise (occupational noise, machinery and explosions, recreational exposure to loud sounds at high volumes and prolonged periods at concerts/ nightclubs/ bars), ageing, and wax or foreign bodies blocking the ear canal (WHO, 2017). Chronic otitis media is a common cause of hearing loss among children today (WHO, 2017).

Hearing loss can happen in both ears (bilateral) or only one ear (unilateral). Deafness included two main types i.e., ***sensorineural hearing loss*** and ***conductive hearing loss***, and can occur separately or together (Smith, Shearer, Hildebrand, & Van Camp, 1999).

Sensorineural hearing loss is caused by cochlear damage or malfunction of the central processing centre of the brain resulting in a loss of volume and clarity of sounds (Alexander & Harris, 2013). Genetic conditions at birth, long exposure to loud noise, drug treatments or illness are the main factors of sensorineural hearing loss. Sensorineural hearing loss can use hearing aids in children which is to be placed behind the ear and connected by a narrow tube to a mould inside the ear, the severe to profound hearing loss may be treated with a cochlear implant in the head or near the ear to assist hearing.

Conductive hearing loss can last temporarily or a lifetime. Treacher Collins syndrome or Goldenhar syndrome happened due to a very small canal or absence in the ear (Tharpe & Gustafson, 2015). Hearing loss due to infection or fluid in the middle ear, wax blockage or foreign objects can be a temporary hearing loss, and very common among indigenous children in remote communities (AIHW, 2015).

A conductive hearing loss is mostly treated by a 'bone conductor' hearing aid, implanting bone conduction at the headband through performing surgery. The device is placed in the bone behind the ear with another device attached to the head with a press stud protruding from the skin or a magnet (Briggs et al., 2015).

Auditory neuropathy is a rare hearing disorder, the quality and quantity of auditory input fluctuates and diminishes in auditory neuropathy (National Institute of Deafness and Other Communication Disorders, 2001).

Syndromes

The knowledge of syndromes has multiplied with more and more research. Over 140 syndromes of hearing loss had been depicted by Konigsmark and Gorlin (1976). Hearing loss can be caused by various biogenetic/clinical disorders or environmental factors (Smith et al. 2014). Bacterial or viral infection causing hearing loss and noise-induced hearing loss are some familiar environmental factors (Kenneson and Cannon 2007; Konings et al. 2009). Heritable hearing impairments can be classified into syndromic and non-syndromic types; syndromic hearing impairment is related to visible abnormalities in the outer ear or other organs, while non-syndromic hearing impairment is related to abnormalities in the middle ear and/or inner ear without the visible malformation of the external ear or any related medical problems (Smith et al. 2014). Waardenburg syndrome (WS), Branchiootorenal syndrome (BOR), Stickler syndrome, Usher syndrome, Pendred syndrome, Jervell and Lange-Nielsen syndrome, Alport syndrome, Mohr-Tranebjaerg syndrome, and mitochondrial syndromic hearing impairment are syndromes that are associated with syndromic hearing impairment. WS, BOR, and Stickler syndrome are autosomal dominant syndromic hearing impairments; Usher syndrome, Pendred syndrome, and Jervell and Lange-Nielsen syndrome are autosomal recessive syndromic hearing impairments; and Alport syndrome and Mohr-Tranebjaerg syndrome are X-linked syndromic hearing impairment.

Mitochondrial DNA pathogenic variants include a variety of diseases, and many of those diseases will cause hearing impairment. Those mitochondrial DNA pathogenic variants are categorized into mitochondrial syndromic hearing impairment. Over 70% of hereditary hearing loss is nonsyndromic, and the different gene loci for nonsyndromic deafness are designated DFN (Smith et al. 2014). Similarly, non-syndromic hearing impairment can be classified by the condition's pattern of inheritance: autosomal dominant (DFNA), autosomal recessive (DFNB), X-linked (DFNX), and mitochondrial, with each of these types containing multiple subtypes (Song et al. 2011).

The typical syndromes related to syndromic hearing impairment are discussed below:

Waardenburg syndrome (WS) is an auditory-pigmentary syndrome due to a deficiency of melanocytes and other neural crest-derived cells. WS was named after a Dutch ophthalmologist Petrus Johannes Waardenburg, who first noticed that people with unusual eye colour frequently suffered from hearing impairment (Read and Newton 1997). According to the other abnormalities, WS can be categorized into four types: WS I, WS II, WS III, and WS IV.

BOR syndrome is a phenotype that consists of hearing loss, auricular malformation, branchial arch remnants, and renal anomalies. Heusinger first recognized the association between hearing impairment, preauricular pits, and branchial fistulae in 1864, and Melnick and Fraser first gave a comprehensive description of the specific phenotypes (Kochhar et al. 2007).

Stickler syndrome is characterized by ophthalmological and orofacial features, deafness, and arthritis. The typical facial features of a Stickler syndrome child are a flat midface with a depressed nasal bridge, short nose, anteverted nares, and micrognathia. Stickler syndrome is categorized into type 1 and type 2, based on the locus heterogeneity and the correlation with the vitreoretinal phenotype (Snead and Yates 1999).

Usher syndrome is the most common form of deaf-blindness, which is characterized by dual sensory impairments: sensorineural hearing loss and then develop retinitis pigmentosa (Kremer et al. 2006). Based on the degree of hearing

loss and result of vestibular function testing, Usher syndrome is recognized in three types: type I, type II, and type III (Smith et al. 2014).

Pendred syndrome associates congenital sensorineural deafness and goitre, which is characterized by the incomplete discharge of radioiodide from a primed thyroid following perchlorate challenge (Gausden et al. 1997).

Jervell and Lange-Nielsen syndrome, described by Jervell and Lange-Nielsen in 1957 as a distinct syndrome, is characterized by congenital deafness and electrocardiographic changes, and the affected individuals have syncopal episodes and may have sudden death (Cusimano et al. 1991).

Alport syndrome, first described by Arthur C. Alport in 1927, is a progressive sensorineural hearing impairment, which will inevitably lead to end-stage renal disease (Kruegel et al. 2013).

Mohr-Tranebjaerg syndrome, also known as a deafness-dystonia syndrome, is an X-linked recessive syndrome usually leading to severe deafness and dystonia and occasionally accompanied by cortical deterioration of vision and mental deterioration (Mendonça et al. 2015).

Illness Length

Hearing loss may be permanent or temporary, however, it usually lasts an individual's lifetime. Advances in medicine and technology have led to improvement in correcting hearing disorders. Cochlear implants or hearing aids are used by individuals with sensorineural hearing loss (SNHL) (Brookhouser et al., 1999). Conductive hearing loss (CHL) can be caused by congenital absence of ear canal, failure of the open ear canal at birth, dysfunction of the middle ear structure, etc., and all of them can possibly be surgically corrected (Raz, 2004).

Natural History, Prognostic Factors, Outcomes

The age of onset, causes, type and level of hearing impairment correlates to the impact of hearing loss. Previous studies revealed that language, academics, and social-emotional development are positively impacted by early identification of hearing loss and intervention (Calderon and Naidu 2000; Yoshinaga Itano et al. 1998).

Perceiving the significance of communication, numerous families battled to decide the most fitting technique for DHH to communicate, whether using sign language or English. Research indicated that only ten percent of DHH children are born to DHH parents and this has led to communication struggles in many families for those hearing parents looking for a suitable communication system (Mitchell and Karchmer 2002). Unemployment rates of DHH individuals are higher when compared to hearing individuals (Danek and Busby 1999).

Psychology of Deafness/Hearing Loss

Hearing loss affects cognitive functioning but not affected intellectual functioning (Braden, 1994). fMRI studies have revealed that the left frontal and temporal lobes are activated while using sign language in DHH individuals as those relying on spoken language (Newman et al., 2002), and activation in the right-hemisphere superior temporal and inferior parietal regions is seen among the native sign language users (Newman et al., 2002). Several studies provided differences in cognitive functioning among DHH individuals who used sign language for communication, including improved peripheral visual attention, mental rotation, image generation, and face processing compared with normal hearing (Hauser et al., 2006; Marscharck & Hauser, 2009). But, if the test was conducted by a familiar evaluator or using a preferred communication mode may not show a difference on standardized, nonverbally administered intelligence tests between DHH and normal hearing (Braden, 1994; Maller, 2003). The difficulty of communication in the Hearing loss of children hampers the parent-child relationship and attachment (Meadow-Orlans, 1990).

There has been an endless substantial debate regarding the “psychology of deafness,” that DHH has certain unique traits (Paul & Jackson, 1993). Some suggested that this perspective of DHH having unique traits is culturally biased (Lane, 1988). It was suggested that hearing loss indirectly affects a person’s development as auditory information is the most important factor for one’s development (Hauser et al., 2006). DHHs are more exposed to the challenges of academic difficulties, low self-esteem, inconsistent discipline, and sexual/ physical abuse in comparing similar ages of normal hearing (Black & Glickman, 2005; Simeonsson et al., 2001).

Poor communication skills correlate to poor psychosocial functioning which significantly limits access to therapeutic intervention (Black and Glickman 2005). Clinicians who are not trained to work with deaf patients may find difficulty in diagnosing correctly and might over-diagnose psychotic disorders. Whereas, with those mental health specialists who are trained to assess deaf patients, there are lower rates of and a greater range of less severe psychiatric problems are reported (Black and Glickman 2009).

Treatment

There are various treatments for DHH individuals depending on the cause, level and type of hearing loss. There are different treatment approaches for different individuals and what might be effective for one individual may not be effective for others. Minor surgeries, such as the insertion of pressure equalization tubes or antibiotics are used as a treatment for individuals with conductive hearing loss. The use of hearing aids or a cochlear implant (CI) is a common treatment for individuals with sensorineural hearing loss (Pisoni et al., 2008).

Interventions for Hearing Impairments

Hearing Assistance Devices: Many hearing aids or devices have been developed and used to assist hearing by amplifying the sound. These devices are usually to be worn behind the ear with a mould in the ear. Audiologists prescribed hearing aids for sensorineural hearing loss.

Cochlear implant (CI). A cochlear implant is a common treatment used for individuals with severe to profound sensorineural hearing loss. The auditory nerve is stimulated through a device which is implanted under the skin near the ear with an electrode going into the cochlear. Behind the ear, a speech processor is worn externally which is connected by a coil with a magnet that sends a signal to the implanted device and provides approximations of speech sounds and partial hearing (National Institute of Deafness and Other Communication Disorders, 2016). A cochlear implant helps in giving out a better quality of sound signals and enhanced normal language and speech development. A significant number of children with a cochlear implant are reported to not respond well to it and gain little spoken language (Humphries et al., 2014). Latest research recommends that children born deaf should learn sign language from the beginning, regardless of an eventual CI or

hearing aid, because signing can stimulate language areas of the brain at an early age (Humphries et al., 2014).

Comorbidities and Complicating Factors

The prevalence of DHH children diagnosed with Autism is double or more than that of the hearing population (Szymanski, Brice, Lam, & Hotto, 2012). Children with Down syndrome are vulnerable to conductive hearing loss, normally because of narrow ear canals and chronic otitis media which further reduces their auditory input and language ability (Fisher, 2015; Roizen et al., 1993). Vestibular disorders have also been linked with hearing loss, which causes dizziness and poor balance (Santos, Venosa, & Sampaio, 2015).

Mental Health

World Health Organisation (WHO, 2018) defined Health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." The definition implied that mental health is more than just the absence of mental disorders or disabilities (WHO, 2018). According to WHO (2018), Mental health is "a state of well-being in which an individual realizes his or her abilities, can cope with the normal stresses of life, can work productively and can make a contribution to his or her community". Keyes (2012) stated mental health is a combination of emotional (emotional well-being refers to the realization of well-being), social (social well-being refers to the effective functioning of a person in the community) and psychological well-being (psychological well-being refers to effective individual functioning). The Indian Mental Healthcare Act, 2017 (IMHA) defined mental illness as "a substantial disorder of perception, thinking, orientation and mood or memory that grossly impairs behaviour, judgement or the capacity to recognise reality or the ability to meet the ordinary demands of life, or of mental conditions linked to alcohol or drug abuse, but does not include the category of mental retardation which is recognised as arrested or incomplete development of a person's mind, characterised by sub-normality of a person's intelligence".

Mental health is an important gradient for collective and individual ability as a human to think, act, socialize, work and appreciate life (WHO, 2018). Mental health promotion, safety and rehabilitation can be seen as a critical issue for all people at all levels at individual, community and national levels around the world

(WHO, 2018). The assumptions about mental illness, mental health awareness and mental health perception are different from culture to culture depending on cultural practices, values and norms (Choudhry et al., 2016). In this regard, the aetiology of mental health problems and the influencing factors and the effectiveness of intervention and adaptation are based on cultural norms (Harper Shehadeh et al., 2016). Though Mental care is critically important for the individual and community at large, enabling individuals to access and obtain appropriate evidence-based treatment promptly guaranteed in many countries (NHS, 2014) but many nations have insufficient programs and facilities for mental health today(WHO, 2009).

Many factors decide an individual's degree of mental health consisting of social, psychological, and biological variables (WHO, 2018). Several studies have been taken up and found the influence of social factors on mental health, recognising the relationship between social determinants and mental health as bidirectional, and vice versa (Bährer-Kohler, 2012). The changing world with its rapid societal changes, unstable working environments, gender inequality, social isolation, unhealthy habits, physical illness and abuses of human rights are often correlated with poor mental wellbeing (WHO, 2018). Specific personality factor seems more susceptible to mental problems.

Some are at greater risk of mental health conditions even in the same society that an individual’s families living in poverty, marginalised communities, people with chronic health problems, children living with deprivation and violence, substance abusers, minority and indigenous communities, elderly people, and low-class society. Additionally, prisoners, war veterans, and victims of disaster and humanitarian crises are other vulnerable groups (WHO, 2013b).

The global burden of mental illness is concentrated among the low and middle-income in all countries, contributing to almost 80% of the world's population; low income is positively correlated with common mental illnesses and poverty (Lund et al., 2010).

Some determinants of mental health at the individual level are adverse early life experiences, weak family and social networks, social exclusion on race, disability, gender or sexual orientation, and exposure to trauma at a young age (WHO & Calouste Gulbenkian Foundation, 2014).

The global adult population of mental health conditions is increasingly prevalent (Ferrari et al., 2013) that poverty, weak self-reported socioeconomic background of the entire family, the underlying reality of not earning a minimum wage for healthy lifestyles, poor education, reduced social stability and stressful life events have been recognised as the major causes of mental health in adult age (Marmot Review Team, 2010). Mental problems like depression and anxiety are found linked to work loss and long-term unemployment (Marmot Review Team, 2010).

Young adults highly oppose finding psychiatric support even though a behavioural illness has developed (Gulliver et al., 2010), only 18 to 34 per cent of young adults with elevated levels of depression seek psychological assistance which may extend across the life cycle (Gulliver et al., 2010), ages between 16 and 24 years found to raise the help-seeking due to the programs targeted reaching younger people may increase help-seeking (Gonzales et al., 2009; Calloway et al., 2012; Gulliver et al., 2010).

Elderly mental well-being is predicted by the earlier life experiences, and circumstances surrounding ageing, post-retirement, level of social support and the ageing process as perceived by the culture. It was accepted that older people are at greater risk of depression, and some age-related life events including hardship, loss of status, declining physical health, chronic pain, poor or restricted mobility, and diminished social interaction are strong risk factors (McCrone et al., 2008). The social isolation and lack of family interaction may lead to depression in women resulting in chronic health issues with lack of physical activity (Grundy et al., 2013). Around 10% of elderly people are socially isolated which predicts poor mental health, depression, poor memory, reliance on alcohol, suicidal ideation, and even death (Grundy et al., 2013); high levels of education are protective for women (Ploubidis & Grundy, 2009).

It is estimated that fewer than half of people with mental health issues seek professional help (Swami, 2012; Tedstone Doherty & Kartalova-O'Doherty, 2010; Gulliver et al., 2012), between 16 and 24 years of age hardly seek professional help (Rickwood & Thomas (2012), prevalence exceeds help-seeking at all ages (Gulliver et al., 2010; Rickwood & Thomas, 2012). The most significant barriers to seeking

professional help for mental health include a preference for self-reliance, self-stigma, lack of knowledge of mental health services and poor ability to detect among young adults (Gulliver et al., 2010; Yap, Wright & Jorm, 2011; Vogel, Wade & Hake, 2006; Gulliver, 2010). Research on mental health services has shown that early adult help-seeking has a life-span impact (Gulliver, 2010; Vogel et al., 2006).

Men are higher in help-seeking for mental health than women due to self-stigma in the quest for clinical help is higher (Vogel et al., 2006; Tedstone Doherty & Kartalova- O'Doherty, 2010). Women identify mental health issues more than men and reported higher levels of existing mental distress than men (Tedstone et al., 2010). Research outcomes suggested that Gender-specific treatment interventions be implemented to meet the multiple factors of mental health help-seeking (Tedstone et al., 2010).

Wellbeing

There has been a considerable acceptance of the concept of well-being as the optimal psychological functioning and experience which was given by Ryan and Deci (Ryan & Deci, 2001). Wellbeing is conceptualized to include emotional, psychological, and social well-being for both hedonic and eudaimonic well-being. Keyes (2005) says mental health is a "state in which individuals are free of psychopathology and flourishing with high levels of emotional, psychological, and social well-being".

Keyes (2002) introduced the complete mental health model that mental health not necessarily indicated by the absence of psychopathology; rather, it is the absence of mental illness with "a syndrome of positive feeling symptoms and positive functioning in life. Even Mental wellbeing is presented with a series of symptoms that affect daily cognitive and social functioning. Keyes (2002) mentioned that mental wellbeing comes within a spectrum between complete and incomplete mental health. The three dimensions of wellbeing are emotional, psychological and social wellbeing (Keyes & Lopez, 2005). The presence of positive outcomes, the lack of adverse effects and perceived happiness with life are the three components of mental well-being (Keyes, 2002). Like depression is more than anhedonia, mental wellbeing is more than the existence of emotional well-being (Keyes, 2002), practising healthy functioning in life is necessary to experience maximum mental wellbeing, and that

positive functioning should practice at individual and societal capacity. By doing contribute to society will give a feeling that society as appropriate, important, and having the potential for the development of social well-being. Thus, maximum mental wellbeing is demonstrated by a healthy mix of emotional, psychological, and social well-being (Keyes, 2002; 2005a). Social, psychological, and emotional well-being are collectively referred to as well-being for this study. Therefore, as measured by the Mental Health Continuum (Keyes, 2002; 2005a), the measure of the wellbeing of individuals is representative of their complete mental health.

Mental well-being has been recognized as a distinct construct from mental illness, and recent research has shown that increased mental well-being is correlated with reductions in symptoms of depression and anxiety (Keyes, 2010). Ryff's (2014), found that mental well-being correlates to a variety of risk and protective factors predicting symptoms of depression and anxiety. Some mental well-being models included Ryff's psychological well-being model and Seligman's positive psychology model and Key's two continuous.

The positive psychology model proposed by Seligman (Seligman, 2010; 2011) refered 'mental well-being' as being at a point beyond neutral with a mental disorder on a single scale where mental well-being is not just an absence of disease. Increases in mental well-being will, by this definition, have a direct correlation with reductions in symptoms of mental illness. The Keyes model also referred to as the two continua model of mental health (Keyes, 2002; 2005; 2006), identified the mental illness and mental wellbeing as closely related but separate constructs with their unique continua. The two continua models are validated by results from a variety of studies by different researchers, which indicated that mental well-being ratings and symptoms/diagnoses of mental illness can vary independently of each other (Hides et al., 2016; Keyes et al., 2010; Lyons, Huebner & Hills, 2013; Masse et al., 1998; Renshaw & Cohen, 2014; Suldo & Shaffer, 2008). Keyes observed that people with an active mental disorder can also have multiple physical, emotional and psychological well-being components, and people with no diagnosable mental illness can have very low social, emotional and psychological well-being ratios (Keyes et al., 2010). According to Keyes (2007), to achieve complete mental health, one must have both flourishing mental well-being and no mental disorder. It can be considered that a person with high social, emotional and psychological well-being who, for

example, enjoys healthy interactions, environmental mastery, social contribution and meaning in life, but still experiences symptoms of a mental disorder such as anxiety, has high overall mental well-being, but not complete mental wellbeing.

A model of psychological well-being was developed by Ryff (1989; 2014) with six dimensions: self-acceptance, positive relationships with others, autonomy, environmental mastery, purpose in life, and personal growth. The mental well-being model of Keyes integrates not only these six dimensions from the psychological well-being model of Ryff, but also the five dimensions of the social well-being model of Keyes (1988) i.e., social integration, social contribution, social coherence, social actualization, and social acceptance, and two elements of emotional wellbeing i.e. positive affect and avowed quality of life.

Two traditions of well-being study are presently differentiated: one focuses on hedonic well-being, the other on eudaimonic well-being (Keyes et al.. 2002; Ryan & Deci, 2001; Waterman, 1993). Hedonic well-being encompasses feelings of happiness, satisfaction and interest in life and is considered emotional well-being (Keyes, 2007). Waterman (1993) claimed that this is an empirical translation of the ancient Greek hedonist philosophy, incorporated by Aristippus, among others. This practice in the social sciences dates back to survey studies in the 1960s and 1970s when researchers began researching the quality of American life from the point of view of people themselves (Andrews & Withey, 1976; Bradburn, 1969; Campbell et al., 1976; Cantril, 1965; Gurin et al., 1960). These surveys aimed to track the population's well-being and to develop social policies. There is a common agreement at present that this form of well-being is a multidimensional term, involving emotional perceptions of life in general (i.e., life satisfaction) and the existence of positive affects and the absence of negative affects (Diener, 1984; Diener et al., 1999; Westerhof, 2001). There was some dissatisfaction with the limited depiction of well-being in the hedonic tradition in the 1980s and 1990s (Ryff, 1989; Waterman, 1993). In terms of human endeavours and optimum functioning, psychologists began to focus on the concept of well-being (Ryan & Deci, 2001; Ryff, 1989), which gave birth to the second research tradition, called eudaimonic well-being. The definition of eudaimonia goes back to Aristotle, for whom the basic aspect of a good existence was not pleasant, but the realization of one's own ability (Waterman, 1993). Ryff's philosophical and analytical work has become the most

influential (Ryff 1989; Ryff & Essex, 1991; Ryff & Keyes, 1995). Earlier psychological hypotheses on optimal production of lifespan (i.e Erikson, Jung, Neugarten), on optimal functioning and self-actualization (i.e Allport, Maslow, Rogers), and on good mental wellbeing (such as Jahoda) were investigated by Ryff and six fundamental elements of positive functioning were discovered in this literature repeatedly. These six components combined comprise what she terms psychological well-being (Ryff, 1989; Ryff & Keyes, 1995). To become a better individual and to understand one's ability, each of them is necessary:

1) *Self-acceptance*: a positive and acceptant attitude toward aspects of self in past and present;
2) *Purpose in life*: goals and beliefs that affirm a sense of direction and meaning in life;
3) *Autonomy*: self-direction as guided by one's own socially accepted internal standards;
4) *Positive relations with others*: having satisfying personal relationships in which empathy and intimacy are expressed;
5) *Environmental mastery*: the capability to manage the complex environment according to one's own needs;
6) *Personal growth*: insight into one's own potential for self-development.

Ryff's study focuses primarily on optimum functioning in terms of human satisfaction, as other clinical work on eudaimonic well-being (Ryan & Deci, 2001). Keyes (1998) proposed that the optimum social processing of people in terms of their social participation and social embeddedness must also be observed. Therefore, to identify indicators of what it takes to thrive socially, he studied the work of classical sociologists and social psychologists, including Marx, Durkheim, Seeman, and Merton. His conceptual review reveals that social well-being consists of five dimensions that characterize an optimally performing entity in society:

1) *Social coherence*: being able to make meaning of what is happening in society;

2) *Social acceptance*: a positive attitude toward others while acknowledging their difficulties;

3) *Social actualization*: the belief that the community has potential and can evolve positively;

4) *Social contribution*: the feeling that one's activities contribute to and are valued by society;

5) *Social integration*: a sense of belonging to a community.

The concept of good mental health is hedonic well-being and the psychological and social dimensions of eudaimonic well-being combined (Keyes, 2005; 2007). They can be used as arbitrary assessments of the key elements of the concept of good mental wellbeing by the World Health Organisation (Westerhof & Keyes, 2008).

Keyes (2002) proposed that a balance of emotional, psychological and social well-being is required to be deemed mentally healthy. He described *flourishing* as a situation in which people combine a high degree of subjective well-being with an optimum degree of psychological and social functioning. Similarly, *languishing* refers to a situation in which low levels of emotional well-being and low psychological and social well-being are combined. Those who are not languishing or flourishing are found to have moderate mental health. Keyes (2002, 2005a) argued that the opposite ends of a single spectrum do not land on mental health and mental illness; rather, they are distinct structures that correlate poorly with each other. As such, a two-continuum model with the separate yet associated latent variables of mental health and mental disease was delineated by his complete mental health model (2002). According to this model, complete mental health is said to be achieved by people who are flourishing, where elevated levels of well-being are combined with low levels of mental illness. Individuals feel positive about them while flourishing and agree that they work better in life. In comparison, the dimensions of well-being are poor for languishing people, which means that they do not love life and do not perceive their functioning in life to be positive. Languishing people feel emptiness, hopelessness and stagnation. In comparison, mental illness is strongest in persons who are languishing. The final category identified by Keyes (2002) was the moderately healthy category seen in those individuals who do not flourish or languish in life.

Emotional Well-being (EWB)

The presence of positive emotion and life satisfaction is necessary for emotional wellbeing (Diener, Suh, Lucas, & Smith, 1999), balance between good and negative consequences with a cognitive measure of life quality in general (Keyes, 2003) which determine the individual's assessment of their lives (Xu & Xue, 2014). The EWB has been conceptualized as a "hedonic" type of well-being concerning the personal appraisal of one's happiness and pain mitigation. EBW categorised into two components- life satisfaction and affective balance (Christopher, 1999). Life satisfaction is the subjective cognitive assessments of one own's life whether or not "the good life". Affective balance concern how someone's degree of positive effect relates to the degree of negative effect encountered in his life, whether the positive effect outweighs the negative effect or not (Christopher, 1999). In the emotional paradigm of Diener and others (Diener et al., 1999), the Subjective Well Being (SWB) included emotional well-being and pleasure, indicating the nature of the estimation of their own lives that consist of life satisfaction as the presence of positive affect and absence of negative affects. For example, those who are successful in engaging in frequent positive affect are more satisfied (Diener et al., 1998). A high prevalence of optimistic thoughts and emotions in one's life is embodied with pleasure or subjective well-being live having the presence of positive and absence of negative affect in his life, meaning thereby having life satisfaction. Individual feelings of happiness widely predicted by employment and marriage (Myers & Diener, 1995), along with an understanding of the past, current, and future of own life. The past life of a person linked to contentment and happiness, the present of life of emotion with Joy, rhythm, ecstasy, and sensual sensations, future emotional wellbeing with hope and confidence lead to emotional well-being (Fredrickson & Joiner, 2002). Emotional well-being is bi-dimensional (Bradburn, 1969), consisting of positive and negative affect, when positive effect higher than the negative affect is considered as high quality of life whereas negative affect higher than positive affect as low quality of life.

Social Well-being

Social well-being involves individual integration with society – relationship with others, understanding and well-integrated with societal movement, matching his

interests and beliefs with the social system as being a part of (Ryan & Deci, 200l). Social well-being also necessitates the social environment including social interactions, capacity to participate in the society along with others (Ryff, 1989), connectedness, partnerships, self-esteem, and life fulfilment (Ryff, 1989). Keyes's The Five Elements of the social well-being system proposed an analysis of social integration, social contribution, social coherence, social actualization and social acceptance for the measurement of social wellbeing (Keyes, 1998) at the Individual level. Social well-being is one's state and functioning in society (Keyes, 1998).

Social integration. Social integration is the degree to which people believe they have much in common with the society he belongs, reflecting in their social experience, and feeling of belongingness to their societies. Social cohesion (Durkheim), cultural estrangement and social isolation (Seeman), and class consciousness are originated from social inclusion (Marx). Social coordination and wellbeing represent the fondness of the social norms and relationship maintained in society; whereas cultural estrangement is the rejection of culture and lifestyle not constitute the society with breaking up from norms to maintain isolation for own sense (Seeman,1959, 1983, 1991; Merton, 1949).

Social acceptance. Social acceptance is the social analogues of personal acceptance, having a positive opinion as deserving compassion toward a member of the society, relaxed with others, by the character and attributes of other individuals as a generic category, is the creation of culture (Wrightsman, 1991; Horney, 1945); having a stable identity in the society embracing both the good and the negative parts of society that result in good mental health (Fey, 1955; Ryff, 1989); that social acceptance of others equivalence to social equivalent to self-acceptance.

Social contribution. The appraisal of one's social worth is social contribution. It requires the conviction that, with something of worth to offer to the world, one is a vital part of society. Social contribution is akin to the principles of efficiency and transparency. Self-efficacy is the assumption that such behaviors can be carried out (Bandura, 1977) and particular tasks can be accomplished (Gecas, 1989). The concept of ethical responsibilities that ultimately relate to society is social responsibility. Social contribution represents whether people believe like everything they do in the world is respected by society and adds to the commonweal,

and to what degree. This definition is in line with the thesis of Marx that humans are inherently productive (Israel, 1971). The economic equivalent to the reduction of the relative worth of one's life and daily tasks is alienation. Generative intentions and actions are the developmental analogue of social contribution. Midlife, according to Erikson (1950), is a time where, by molding the next generation into active members of society, adults will act on their ability to contribute to society.

Social actualization. It is the highest level of psychological development, where the personal potential is fully realized after basic bodily and ego needs have been fulfilled in the society, establishing and maintaining interest, justice, cultural flowering, and love in the society. Common ownership of wealth and property eliminates the need for self-aggrandizement. So, the estimation of the potential and the trajectory of society is social actualization. It is the trust in humanity's evolution and the feeling that society has promise that understands by the institutions and people, feeling of being future winners of social development, understand by the people, optimistic about status and prospects, and they will appreciate the promise of society. Social actualization is analogous to fatalism (Lefcourt, 1982) and impotence (Seeman, 1991), which emphasize self-realization (Maslow, 1968), eudaimonic satisfaction (Waterman, 1993), and personal growth (Ryff, 1989).

Social coherence. The understanding of the quality, structure, and function of the social environment is social coherence, and it requires a respect for knowing the world. Not only do healthier people think for the kind of world they live in, but they also believe like they should understand what is going on around them. Such people do not delude themselves that they live in a perfect world; they have maintained or promoted the desire to make sense of life. Social coherence is related to life's meaninglessness (Mirowsky & Ross 1989; Seeman, 1959; 1991), and entails evaluations of how discernible, sensible, and predictable society is. Healthier people mentally view their personal life as significant and cohesive (Ryff, 1989). According to Antonovsky (1994), the concept of personal coherence can be a predictor of health: when confronted with unexpected and stressful life events, people who have coherence try to preserve coherence.

Psychological well-being

Psychological well-being corresponds to healthy mental health (Edwards, 2005). Analysis has demonstrated that psychological well-being is a multidimensional phenomenon that evolves by a mixture of emotional control, personality traits, identity and life experience (MacLeod & Moore, 2000; Ryff, 1989b; Wissing & Van Eeden, 2002), which develops (Helson & Srivastava, 2001). With age, experience, extraversion and awareness, psychological well-being will rise and decrease with neuroticism (Keyes et al., 2002).

In terms of gender, evidence has shown that psychological well-being indicators donot vary substantially between men and women (Roothman, Kirsten & Wissing, 2003). In addition, the understanding of physical health and spirituality will mediate the link between context and psychological well-being (Temane & Wissing, 2006a; 2006b). Psychological well-being has encountered comprehensive scientific research and analytical appraisal (Wissing & Van Eeden, 1998). No single consensual philosophical interpretation of psychological well-being is presently available. The original understanding of psychological well-being by Bradburn (1969) offered a representation of the difference between positive and negative affect. Preliminary studies centered primarily on the perceptions of positive and negative affect, subjective well-being and satisfaction with life that emerged around the Greek word 'eudemonia,' which was translated as 'happiness' (Ryff, 1989b). Happiness has been characterized as a combination of positive and negative results. This original subjective conception of well-being was used by several early scales, such as Diener, Emmons, Larsen & Griffen's (1985) Satisfaction with Life Scale, on which a substantial amount of study was carried out (Conway & Macleod, 2002; Diener et al., 1985).

This original subjective definition of well-being was used by several early scales, such as Diener, Emmons, Larsen & Griffen's (1985) Satisfaction with Life Scale, on which a substantial amount of study was performed (Conway & Macleod, 2002; Diener et al., 1985). Her thesis is logically and conceptually based on Maslow's (1968) self-actualization conception, Rogers' (1961) perception of the fully functioning personality, Jung's (1933) individualization formulation, Allport's (1961) maturity conception, Erikson's (1959) psychosocial stage model, Buhler's (1935)

essential life satisfaction tendencies, Descriptions of attitude transition in maturity and old age by Neugarten (1973), and six optimistic mental wellbeing requirements by Jahoda (1958), as well as additional more meaningful connotations of 'eudemonia,' such as discovering ability in any sort of difficulty. Study by Ryff (1989b) culminated in the creation of a new quantitative indicator of psychological well-being (Conway & Macleod, 2002; Keyes et al., 2002; Ruini et al., 2003; Ryff, 1989b; Ryff & Keyes, 1995), with the following components autonomy, personal growth, environmental mastery, purpose in life, positive relations with others and self-acceptance. This scale is known to be the highest quantitative indicator of good mental health (Conway & Macleod, 2002).

Personal growth. The desire to build and extend oneself, to become a fully developed human, to self-actualize and attain goals is personal growth (Ryff, 1989b; Ryff & Keyes, 1995). To reach peak psychological functioning, one must continue to improve oneself by development in different areas of life (Ryff, 1989b). This requires one to develop and solve challenges constantly, while expanding one's strengths and skills. Continued development is associated with an increased degree of personal growth, while a depleted level suggests a lack of growth. Sportspeople with a development mentality recognize that diligent work creates outcomes (Dweck, 2005). A growth mindset requires tolerance to a spectrum of fresh and varied perspectives. Humble but optimistic athletes are actively working for personal improvement and sustainable progress (Weinberg & Gould, 2007); they typically use good and negative performances to boost personal growth, as well as goals achieved. Personal growth is theoretically the dimension of psychological well-being nearest to eudemonia (Ryff, 1989b).

Environmental mastery. Environmental mastery refers to the preference and influence of physical and/or mental acts of the surrounding and perceived environment (Ryff, 1989b; Ryff & Keyes, 1995). While a high degree of environmental mastery represents power over one's background, a low level is connected to the failure to control one's environment effectively (Ryff, 1989b). In diverse circumstances, a mature person is usually able to communicate and react to many individuals and respond to different scenarios on the invitation. Being in physiological and cognitive arousal regulation can increase the control and perception of the world of an athlete, as well as their relationships with others.

Imagery leads to increased self-awareness and improved perception of circumstances and the environment (Potgieter, 1997; Weinberg & Gould, 2007). Environmental mastery involves being able to manage dynamic circumstances in the environment and life (Ryff, 1989b) and capture the possibilities that present themselves.

Purpose in life. Purpose in life refers to the perceived sense of one's nature and requires setting and achieving goals that lead to the recognition of life (Ryff, 1989b; Ryff & Keyes, 1995). Mental well-being requires recognizing that one has a larger meaning and goal in life (Ryff, 1989b). Purpose in life provides direction and thereby eradicates despondency. Goals are an integral aspect of achieving accomplishment (Miller, 1997). Maturity implies a strong sense of intentionality (Ryff, 1989b).

Positive relations with others. Positive relations with others are an important aspect of establishing trusting and enduring relationships, as well as being part of a contact and support network (Ryff, 1989b; Ryff & Keyes, 1995). A cool and comfortable attitude represents experience, contributes to improved relationships, and others are better taken into account. While good relationships lead to an appreciation of others, bad relationships can trigger resentment (Ryff, 1989b). One main characteristic of mental well-being is the capacity to have healthy human interactions with pathology also marked by a deficiency of social functioning (American Psychiatric Association, 2000). Communication is an integral aspect of team relationships (Miller, 1997; Potgieter, 1997). Good interactions with others in group/team environments also result in expanded awareness, empowerment and better athletic results.

Self-acceptance. The most recurring element of psychological well-being is self-acceptance. It is an integral trait of mental wellbeing and an aspect of optimum functioning (Ryff, 1989b; Ryff & Keyes, 1995). Good self-acceptance levels build a healthy outlook and increase life satisfaction (Ryff, 1989b). Moderate trust levels contribute to greater success and recognition (Wann & Church, 1998; Weinberg & Gould, 2007), with constructive input from those who are critical in sustaining self-confidence and conviction. Self-acceptance is a core component of self-actualization, increased mental functioning and development (Ryff, 1989b). This includes embracing the past and current as well as preserving direction for the future.

Mental Health Problems

Some of the mental health issues that are being researched, including anxiety, insomnia, somatic symptoms and severe depression, have been identified in the current thesis. The prevalence of these mental health conditions is assessed in this sample using the General Health Questionnaire-28 (Goldberg, 1978).

Anxiety

Anxiety is characterized as a state of intense worry, discomfort and apprehension followed by physiological symptoms linked to the autonomic nervous system's arousal (Eysenck, 1992); explaining multiple affective, motor or physiological reactions to unspecific experiences of danger or threat (Eysenck, 1992; Kaplan & Sadock, 1981). Threats may be physical - bodily harm expected or arising, psychological - harm to self-esteem or threats to personal well-being (Friedman & Bendas-Jacob, 1997). Anxiety is accepted as one of the neurological effects of stress (Searle, Newell & Bright, 2001). Anxiety has harmful associations that some circumstances can trigger to experience a degree of anxiety. Eysenck (1992) suggested that fear is important to survival giving a warning sign of hazard and risk that motivate and facilitates optimum efficiency. Overdevelopment of threat and danger identification mechanisms can result in feelings of fear in circumstances even when no threat happened.

Symptoms of anxiety include chronic nervousness and physical symptoms such as muscle stress, palpitations, dizziness and epigastric pain (ICD-10; WHO, 2004). Most of these factors of anxiety are related to hearing loss (Fellinger, Holzinger & Pollard, 2012; Schild & Dalenberg, 2012) including cognitive and physical impairments, social isolation, depression and stressful conditions (Vink, Aartsen & Schoevers, 2008).

Depression

Depression is a condition composed of many symptoms, but of different causes, and appears to occur together. Depressive mood or grief is one of the six intrinsic feelings that are part of the psychological existence of humans, but also one of the two major signs that are criteria for psychiatric depression in the Fifth Edition

of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V; American Psychiatric Association, 2013). The other major signs are a loss of capacity to feel joy, experience positive feedback or be involved in the surrounding world (Åsberg & Mårtensson, 2009). Anxiety (e.g. internal anxiety, panic attacks) and reduced mental activity (inability to experience good emotions, emptiness, apathy) are components of depressive syndrome, in comparison to the two primary symptoms. Symptoms of depression, accompanied by increased suicide risk, also include boredom and suicidal thoughts. Other signs of depression can include: reduced ability to focus or make choices, passivity and inefficiency. Depression can also lead to disrupted sleep, including insomnia, intermittent or shallow sleep, or premature waking. In anxiety conditions, clinical symptoms such as chest tightness, shortness of breath and weakness frequently arise and may be the reason people seek health care (Åsberg & Mårtensson, 2009). According to DSM-V (American Psychological Association, 2013), there are two aspects of depression, respectively, polarity and severity. The unipolar affective state with varying degrees of difficulty is the state of depression alluded to in this thesis: clinical depression, dysthymia and mild depression. In addition to three to four of the criteria for symptoms according to the DSM system, the diagnosis of mild depression, which appears to be the most common form of depression in older adults, needs the same period as clinical depression (two weeks or more) (Åsberg & Mårtensson, 2009). In dialogue with the patient, the diagnosis is made based on findings and information obtained, but screening tools/structured interviews may also be helpful as a supplement. Pharmacological and/or psychotherapeutic care options are considered, relying a great deal on the degree of depression, but suicidal risk, bipolarity, melancholia, or psychotic symptoms should also be considered. It is also crucial that each patient should be individually examined and handled based on a detailed analysis of their medical background (Åsberg & Mårtensson, 2009).

Not only does depression induce signs of anxiety, but it also affects the functioning of a person at work, in social life and at home, which are vital aspects of quality of life (Cameron, Habert, Anand, & Furtado, 2014). This negative effect on the functioning of patients is an explanation for why public health services prioritize the disorder (Ferrari, et al., 2013). Depression has different diagnostic and psychiatric expressions that are characterized as being an episodic condition as in

dysthymia with a separate start and end or a more chronic disorder. There is a chance of relapse after the first episode, which rises with every episode. Depression presents itself at varying stages of seriousness (APA, 2013, Ferrari, et al., 2013, Cameron et al., 2014). If you are depressed, the ability to do something declines, you lack stamina, and you have struggled with sleep and weight. You feel useless and have an exaggerated sense of remorse, less capacity to reflect or make choices, and you have pessimistic feelings about yourself and thoughts of death and suicide. Memory challenges and lack of initiative also impair cognitive functioning (Cameron, et al., 2014; APA, 2013). To avoid suicidal attempts or death, it is necessary to have access to suicidal thoughts and ideas. Research in Sweden found that the average long-term suicide risk was 5.6% to 6.8% in patients with depression and elevated suicide risk was correlated with severity and male gender (Bråvik, Mattisson, Bogren, & Nettelbladt, 2008). Beck and Bredemeier (2016) introduced a coherent depression paradigm in a new study that incorporates clinical, emotional, biological and evolutionary viewpoints. In recognizing the essence of depression and how it can better be handled, they point out the value of a multidimensional perspective and advocate for more integrative research.

Depression is defined as feelings of depression, isolation, guilt/shame, anhedonia, and past disappointment based on emotional characteristics (Westermeyer, 2003). In addition, adolescent depression-related signs and symptoms are constant grief, lack of enthusiasm for things once loved, feelings of worthlessness or excessive remorse, boredom, heightened irritability, rage, or aggression (National Institute of Mental Health, 2000). Depression is characterized as low energy, exhaustion, restlessness, lowered libido, insomnia/hypersomnia, increased/decreased appetite, and loss of interest in sex based on physical characteristics (Westermeyer, 2003). There are major shifts in appetite or body weight, psychomotor agitation or retardation, trouble sleeping or oversleeping, recurrent ambiguous, non-specific physical problems such as headaches, muscle aches, stomach aches or exhaustion, and signs and symptoms linked to depression in adolescents (National Institute of Mental Health, 2000). Depression is characterized as reduced attention based on cognitive characteristics and feelings of hopelessness, helplessness, worthlessness, hatred of oneself, and self-blame (Westermeyer, 2003). Signs and signs associated with teenage depression are severe susceptibilities to

refusal or disappointment (National Institute of Mental Health, 2000). Depression is characterized as a lack of involvement in hobbies, withdrawal, decreased socialization, self-injury/suicide, weeping, punishment, and irritability, based on behavioural characteristics (Westermeyer, 2003). Signs and signs consistent with teenage depression include repeated absences from school or low school grades, conversation or attempts to run away from home, outbursts of yelling, moaning, unexplained irritability or weeping, loss of interest in playing with friends, misuse of alcohol or drugs, social alienation, poor coordination, interpersonal problems, and risky conduct (National Institute of Mental Health, 2000).

Because of the high prevalence of comorbidity of physical disease, diminished cognition and elevated suicide risk, depression in older adults may have severe repercussions. More than 50 per cent of lonely elderly people had their first episode after 60 years of age (Fiske, Wetherell, & Gatz, 2009). Female gender, low self-rated health status, stroke history, risky alcohol intake, poor social networks and functional dysfunction are factors that dramatically raise the likelihood of experiencing depressive symptoms in later life (Luppa, Luck, König, Angermeyer, & Riedel-Heller, 2012). In older adults, depressive symptoms are sometimes referred to as "organic," "secondary," or "masked" (Gottfries, Noltorp, & Noergaard, 1997) whereas older individuals are less likely to experience affective symptoms and are more likely than younger adults to display improvements in memory, somatic symptoms, and lack of interest (Fiske et al., 2009). Older adults do not express depressive mood or depression to the same degree as younger age ranges but can exhibit somatic signs such as lack of appetite instead (Hybels, Landerman, & Blazer, 2012). In older adults, mild depression is a typical type of depression, with fewer signs and not as pronounced. Screening methods can be of benefit but should be combined with diagnostics according to the DSM guidelines since it can be difficult to recognise depressive symptoms in older individuals. However, it is clinically important to be mindful of suicidal symptoms that do not follow medical requirements, since they have a direct effect on both mortality and the state of health (Jongenelis et al., 2004). Depressive symptoms are an independent risk factor for SRH loss in elderly people (Han, 2002). Depressive symptoms in older people are also correlated with social networks (Steunenberg, Beekman, Deeg, & Kerkhof, 2006), social reinforcement (Jongenelis et al., 2004), depression (Cacioppo, Hughes,

Waite, Hawkley, & Thisted, 2006) and self-rated quality of life (QoL; Naumann & Byrne, 2004). Currently, pharmacological therapy for various forms of antidepressants is the prevalent treatment for depression among older persons. The analysis focused on eight multi-centre short-term tests, however, did not indicate a greater effect of SSRI (selective serotonin reuptake inhibitor) drugs compared with placebo in people over 65 years of age. Nevertheless, maintenance therapy can lead to the prevention of recurrence of depressive symptoms for those supported by SSRI drugs (Swedish Council on Technology Assessment in Health Care, 2015). Antidepressant treatment can lead to significant side effects, especially in the elderly, such as drowsiness and dizziness (Blazer, 2003) and an increased risk of falls (Modén, Merlo, Ohlsson, & Rosvall, 2010). Since older adults are frequently administered many various kinds of medications, there is often a chance of unfavourable drug-drug reactions (Swedish Council on Technology Assessment in Health Care, 2015). Scientific research promotes the use of treatment, such as cognitive-behavioural therapy, psychodynamic therapy and reminiscence therapy, to alleviate stress in older adults (Bartels et al., 2004; Frazer, Christensen, & Griffiths, 2005; Scogin, Welsh, Hanson, Stump, & Coates, 2005). There is also some evidence that physical exercises in older adults can have a significant impact on depression and should thus be taken into consideration as part of the recovery plan (Lindwall, Rennemark, Halling, Berglund, & Hassmén, 2007; Sjösten & Kivelä, 2006). Earlier research, however, has found that depression is frequently undetected by clinicians in older adults (Gregg, Fiske, & Gatz, 2013; Lotfi, Flyckt, Krakau, Mårtensson, & Nilsson, 2010), and there is an under-use of medication, including drug treatment (Henriksson, Asplund, Boëthius, Hällström, & Isacsson, 2006) and psychotherapy (Gregg et al., 2013).

Since depression in older people has serious repercussions for physical well-being, coping and general quality of life (Fiske et al., 2009), prevention could include ways to avoid this deterioration in overall health status (Cuijpers, Beekman, & Reynolds, 2012). Prevention varies from prevention and rehabilitation because it addresses general demographic populations who range in risk levels for, for example, depression. A structure has been developed by the Institute of Medicine (IOM), USA (Springer & Phillips, 2007) to identify multiple types of prevention where targeted prevention and/or suggested preventive measures could be effective

for older people at risk of depression. Selective prevention is aimed at people with a slightly greater than normal risk of disease, and the prevention suggested is aimed at those with limited yet detectable signs or symptoms of a disorder (Springer & Phillips, 2007). It has been demonstrated that psychiatric therapy can be used to prevent depression in older adults (National Board of Health and Welfare, 2009). In addition, preventive approaches have demonstrated that depressive symptoms are successful and substantially diminished (Jane-Llopis, Hosman, Jenkins, & Anderson, 2003), but there is still a lack of study in this field. (Forsman, Schierenbeck, & Wahlbeck, 2011).

It has been found that more women than men aged 65 years and older suffer from depression by detailed studies (Copeland et al., 1999; Sonnenberg, Beekman, Deeg, & van Tilburg, 2000; Zunzunegui, Alvarado, Béland, & Vissandjee, 2009). Some reports indicate no gender gaps in the incidence of elderly people with depression. For eg, in the age range of 60-79 years old, no statistically meaningful variations between women and men (Stordal et al., 2001)); nearly double the prevalence of depression in women compared to men in a survey of a population aged 55 to 85 years (Sonnenberg et al.,2000). They also noted that there were minor sex variations in connection with risk factors, but women were slightly more susceptible than men to risk factors. Risk factors for males were: not being married or not being married anymore, low wages and low social-emotional support. The risk factors for women were: not being married or no longer being married, having achieved a lower degree of schooling, lower wages, one or more chronic physical diseases and one or more practical restrictions (Sonnenberg et al., 2000). Sex variations in how depression is expressed have been seen in prior research, where women are more likely to internalize (e.g. become silent, cry) and men are more likely to externalize (e.g. display frustration, elevated alcohol intake) (Parker & Brotchie, 2010; Sonnenberg et al., 2000). Men exhibited alternate signs of depression relative to women, according to Martin, Neighbors, and Griffith (2013), and reported slightly higher rates of rage attacks/aggression, drug misuse and risk-taking behaviour. Women have reported much more typical symptoms than men, such as fatigue, irritability, sleep disorders and lack of interest in activities they normally like. The studies found no gender differences when symptoms were paired

with typical symptoms of depression, known to be male-type symptoms of depression (Martin et al., 2013).

Insomnia

Insomnia is a difficulty in initiating or maintaining a restorative sleep, which results in fatigue, the severity or persistence of which causes clinically significant distress or impairment in functioning (APA, 2021); caused by a transient or chronic physical condition or psychological disturbance; which also called agrypnia/ ahypnia / ahypnosia /anhypnia.

There are several sleep-related disorders (5th ed.; DSM-5; APA, 2013) with various symptoms and classifications. The DSM-5 classification encompasses 10 disorders or disorder groups: insomnia disorder, hypersomnolence disorder, narcolepsy, breathing-related sleep disorders, circadian rhythm sleep disorders, non-REM (NREM) sleep arousal disorders, nightmare disorder, REM sleep behaviour disorder, restless legs syndrome, and substance- or medication-induced sleep disorder. (APA, 2013); the syndrome appears three times a week to be diagnosed with insomnia, at least one of the three signs already described, with the condition impairing the capacity of the person to function in major aspects of their life, which is present for at least three months (APA, 2013). The diagnostic criteria of the DSM-5 consist of various *biological, psychological, and social implications*.

Biological Consequences of Insomnia. Insufficient sleep and insomnia are caused by physiological problems (Bonnet & Arand, 2017) associated with hypertension (Schwartz et al., 1999), diabetes (Bonnet et al., 2014), comorbid depression (Troxel et al., 2012) and poorer overall immune function (Savard et al., 2003).

Psychological Consequences of Insomnia. Insomnia sufferers are over-concerned about their bad sleep and trying hard to fall asleep (O'Malley & O'Malley, 2017; APA, 2013) and also try to escape the harmful effects of sleep (Baron et al, 2017; Ong et al, 2012). Many factors such as daytime napping, skipping social activities, using alcohol or other drugs to help initiate sleep and spending increased periods awake in bed (Baron et al, 2017; Ong et al, 2012). The psychological factor of insomnia is daytime sleepiness (Goel et al., 2009), concentration lapses, sluggish response times and behavioural avoidance (Goel et al, 2009; Lowe et al., 2017),

elevated moodiness, daytime fatigue, comorbid depression and anxiety (Goel et al, 2009).

Social Consequences of Insomnia. Insomnia has a great impact on socio-economic facets of life - reducing work efficiency, decreasing job attendance, increasing utilization of medical services, and increasing treatment costs (Godet-Cayré et al., 2006; Leger et al., 2006). (Daley et al, 2009), more hospitalization and using more home health facilities (Kaufmann et al., 2013) with the loneliness of psychological problems (Chu et al.,2016).

Risk Factors for Developing Insomnia. More problems with insomnia were found among women than males, and more among European Americans than other ethnicities (Jean-Louis et al., 2001; Ohayon, 1996), shifting employees more likely to experience insomnia among older adults (Klink et al., 1992). Other risk factors include depression, anxiety, or schizophrenia (Weissman et al., 1997), low socioeconomic status, poor physical fitness, unemployment and being single, widowed, or divorced (Klink et al, 1992; Ohayon, 1996), and high stress contributing insomnia which expatiates the need of the availability of possible insomnia remedies.

Models of Insomnia

Spielman: Behavioral model of insomnia. Spielman and colleagues proposed the Behavioral model of insomnia, which centre on the relationship between predisposing and precipitating (Spielman et al., 1987). The genetic profile might render the person to insomnia (Drake et al., 2011), along with mild discomfort or illness, a loved one's death, and traumatic scenarios (Baron et al., 2017). The perpetuating factors can deteriorate and even uphold symptoms even after medication over time (Baron et al., 2017). The symptoms of insomnia are combined with the bedroom, producing a programmed insomnia reaction once a person is ready for bed (Spielman et al., 1987).

Harvey: Cognitive model of insomnia (Harvey, 2002). Harvey's insomnia cognitive model (Harvey, 2002) focuses on two areas: the perceptions or feelings of the person regarding their condition and arousal-increasing behaviour like rumination (Baron, et al., 2017). Common factors of insomnia are unrealistic or negative beliefs (Harvey, 2002; Harvey & Greenwall, 2003; Morin, et al., 2002) such

as trying to sleep at least 4 hours at night for escaping fired from work. Although the assumption might not be right humans are compelled to work as their belief is valid (Harvey, 2002). Negative views such as lack of sleep may influence the person's mental functioning and general well-being resulting in hypervigilant of multiple sleep-related threats including sleep-related exhaustion or work-related daytime sleepiness; such sleep protection behaviours will be unsuccessful (Harvey, 2002). This cognitive paradigm is the notion of rumination and arousal correlated with sleep that perpetuates insomnia (Baron, et al., 2017) as triggered by elevated physiological or mental arousal levels that hold the body awake by rumination which reinforces unwanted thoughts over and over again (Palagini, et al., 2017), accumulated distress induces degrees of hyperarousal in the body leading to falling asleep (Bonnet & Arand, 1997) which can be described as an anxiety-provoking loop-more difficult to fall asleep (Harvey, 2002).

Neurocognitive model. The neurocognitive insomnia model is a neural basis of arousal (Baron et al, 2017), characterized as programmed brain function (Baron et al., 2017), elevated prefrontal stimulation prevents one's ability to fall asleep as sensory or knowledge retrieval (Baron et al, 2017). People with insomnia have elevated levels of brain wave activation in Beta and Gamma as emotional functioning and processing are correlated with Beta and Gamma brain waves (Başar-Eroglu et al., 1996; Egner & Gruzelier, 2004) make difficulty in falling asleep as a person experiences increased cognitive activity before sleep that arousal and triggers the anxiety-provoking cycle (Baron et al., 2017).

Insomnia is marked by difficulties with starting, managing or achieving good quality sleep that type of occasional insomnia is recorded by one-third of all adults. The prevalence of chronic sleeplessness is 9-10% (Roth & Ancoli-Israel, 1999; Swinkels, 1993). Generally, individuals with insomnia often experience daytime symptoms such as tiredness, mood problems, memory dysfunction and diminished quality of life (Riedel & Lichstein, 2000) including increased absenteeism, wider utilization of health services, psychological and prescription care, and the risk of alcohol and/or drug misuse, and are suppose linked with these day-time effects of insomnia (Walsh & Üstün, 1999); patients with psychiatric illnesses who were referred from primary care to sleep disorder centres (46 per cent) start having primary insomnia than to the second most frequent diagnosis of sleep (22 per cent)

(Hajak, 2000). Some symptoms of primary insomnia are psychophysiological insomnia, sleep state misperception, idiopathic insomnia, poor sleep hygiene, and hypnotic-dependent sleep disturbance (ICSD, 1997).

There has always been a stressor of persistent insomnia that leads to insomnia; the perpetuation of the complaints is also responsible for other variables such as predisposition, maladaptive behaviours and dysfunctional cognitions regarding sleep.

Somatic Symptoms

The Diagnosis and Statistical Manual of Psychiatric Disorders (DSM-IV) characterize Somatic Symptom Disorders (SSD) as "symptoms that are either very distressing or lead to significant disruption of functioning, as well as excessive and disproportionate thoughts, feelings, and behaviours regarding those symptoms" (American Psychiatric Association, 2013); somatization and functional somatic disorders are significant and overlooked concern (Noyes, Holt, & Kathol, 1995). Somatic symptom disorders covered significant physical, economic, and social challenges; depression disorders and anxiety disorders are most often associated with them (Lipowski, 1988); a history of multiple somatic symptoms, hospital visits, and speciality consultations, the involvement of a relative who has persistent and recurring somatic symptoms and severe disability are strongly predictive somatic symptom condition (Silber & Pao, 2003). Somatic symptom disorders are continually under-diagnosed and under-recognized because it is widespread leads to successful care (Murray, Toussaint, Althaus, & Löwe, 2013); increased treatment costs, high disability, dissatisfaction with treatment related to somatic symptom disorders (Murray et al., 2013), repeated unpleasant problems with medical treatment for unexplained symptoms elevated morbidity over the developmental era (Campo, Jansen-McWilliams, Comer, & Kelleher, 1999). The diagnosis of Somatic symptoms is often delayed, indirect, or not reported at all, because of the high prevalence rates, use, and costly treatment in pediatric primary care settings (Levenson, 2011).

Somatic symptoms are severe illnesses but signs that cannot be described or not entirely explained by a psychiatric condition are somatoform conditions, somatization and medically unexplainable symptoms (MUS) that sign often arise and

create a strain for patients, their families, and their physicians linked with severe job instability (Escobar et al., 1987; Rask et al., 2015). The lack of a medical diagnosis for the symptom may continue for at least six months causing severe disability or discomfort in functioning ((DSM-IVTR, 2000) as its difficulty in determining the symptom medically (Barsky, 2016) creates confusion for the physician about the client, individual peers have trouble on the psychologically inexplicable (Frances, 2013); the psychiatric diagnoses insult the patients causing stress and induce problems (Kirmayer, Groleau, Looper, & Dominicé, 2004). Somatization is a psychological discomfort that arises during exposure to stress (Lipowski, 1968) but updates the definition in the DSM-IV-TRR (APA, 2000).

The diagnostic difficulty of somatic symptom condition can trigger many negative reactions, such as defensiveness, anger, and anxiety (Ibeziako & Bujoreanu, 2011) that many patients and their families will react adversely to a diagnosis of somatic symptom disorder taken as a product of feeling disrespected of the psychiatrist starts accusing him of dishonesty or craziness, after which the doctor's abandonment inevitably follows (Barnum, 2014; Silber & Pao, 2003).

Early detection, evaluation, assessment and care of patients with somatic symptom disease needs to be systematic because medically unexplained physical symptoms are frequently correlated with disability and suffering (Campo, 2012), it is expected that awareness and experience in the treatment of somatic symptom conditions making a huge difference in the lives of patients and the professional on success (Ibeziako & Bujoreanu, 2011) but that required a multidisciplinary approach. The multidisciplinary technique focuses on improving care, promoting collaboration, helping people and their families recognise the mind and body connections, embracing bio-psycho-social formulation and treatment, incorporating cognitive behavioural therapy in practical, and eventually managing school guidance (Campo & Fritz, 2001; Houtveen, van Broeckhuysen-Kloth, Lintmeijer, Bühring, & Geenen, 2015; Ibeziako & Bujoreanu, 2011). Not the availability of systematic protocol for the diagnosis and treatment of somatic symptom symptoms in patients resulting in substantial delays in diagnosis, repeated hospitalizations, and inadequate procedures, a psychiatric phase is not considered (Allen & Woolfolk, 2010; Campo, 1999; Sumathipala et al., 2008).

Social Dysfunction

Social dysfunction is an individual's diminished capacity to connect with his relatives, peers, and peer groups and to engage in mutual behaviours at previously identified levels (Bosc, 2000). Common factors of social dysfunction are repeated arguments with others, feeling dissatisfied with their ability to help and interact in their capacity (Weissman, 1981), detrimental to physical and mental health outcomes to survival (Holt-Lunstad, Smith & Layton, 2010), and quality of life reduced and has to compromise if these are reduced (Cohen & Wills, 1985). Social dysfunction is linked to serious health consequences and premature mortality (Eisenberger & Cole, 2012; Holt-Lunstad et al., 2015).

Intelligence

Charles Spearman (1904; 1923) established the ***two-factor theory*** and used a technique known as factor analysis; also mention the single g-factor which represents an individual's general intelligence across multiple abilities and a second factor, s, an individual's specific ability in one particular area (Thomson, 1947).

Thurstone (1938) coined the concept of a g-factor and identified the primary mental abilities which are verbal comprehension, verbal fluency, number facility, spatial visualization, perceptual speed, memory, and inductive reasoning.

Gardner (1983, 1987) proposed ***multiple intelligence*** as no single intelligence but rather distinct, independent multiple intelligences exist, each representing unique skills and talents relevant to a certain category; and initially proposed seven multiple intelligences: linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal, and intrapersonal.

Cattell-Horn-Carroll Theory

Raymond B. Cattell (20 March 1905 – 2 February 1998) proposes a distinction between "fluid intelligence" (Gf) and "crystallised intelligence" (Gc). John Horn expanded the Gf-Gc model to include 10 broad abilities: Comprehension-Knowledge (Gc), Fluid reasoning (Gf), Quantitative knowledge (Gq), Reading & Writing Ability (Grw), Short-Term Memory (Gsm), Long-Term Storage and Retrieval (Glr), Visual Processing (Gv), Auditory Processing (Ga), Processing Speed (Gs), and Decision/Reaction Time/Speed (Gt). The Cattell-Horn-

Carroll (CHC) paradigm is the most generally recognized and empirically validated system for understanding the nature of knowledge (Schneider & McGrew, 2012).

The Triarchic Theory of Intelligence (Three Forms of Intelligence) proposed by Sternberg (1985) which against the psychometric approach to intelligence and takes a more cognitive approach as cognitive-contextual theories, having three meta components: componential, experiential, and practical and called triarchic components: and define intelligence as "(a) mental activity directed toward purposive adaptation to, selection and shaping of, real-world environments relevant to one's life". Raven's Progressive Matrices (RPM) is a nonverbal test used to measure general human intelligence and abstract reasoning and is regarded as a non-verbal estimate of fluid intelligence. The present study employed the RSPM for the evaluation of intelligence.

Review of Literature

Hearing loss impact has been recognised, and affected millions of individuals all over the Globe about 466 million individuals suffered from hearing loss (WHO, 2020), and hearing damage was identified as the third source of long-term disability in the Global Burden of Disease (Hasson, Theorell, Bergquist, & Canlon, 2013), 2 3% of Americans at 12 years or older were affected by moderate unilateral (single-sided) hearing loss, 1 in 7 % of Americans had bilateral (double-sided) hearing loss (Goman & Lin, 2016). Noise-induced hearing loss is more common among residents of cosmopolitan cities compared to residents living in rural areas (Kumar, Sahu, Basod, & Patel, 2017) people living in cosmopolitan areas between the ages of 21-30 have a more considerable effect on their hearing than those who reside in small towns and rural areas (Kumar et al., 2017; Wang et al., 2019). Hearing loss treatment cost is very high, and untreated also have further costs around $750 billion annually over the Globe (WHO, 2020) including stigmatizing, expensive to use assistive technology (hearing aids and cochlear implants) which discourage affected persons from getting treatment at times of the first occurrence and not engaging in social activities (Blazer & Tucci, 2018; Powell, Jacobs, Noble, Bush & Snell-Rood, 2019). If the affected person has taken up the preventive measures, treatments, and instruments at an early stage of hearing loss and would be more cost-effective for the long term with less impact as many DHH individuals between 21 and 50 years of age

have unhealthy beliefs towards diagnosis and the long-term implications of untreated hearing loss (Hunter, 2018; Idstad, Tambs, Aarhus, & Engdahl, 2019). Young and middle-aged Adults with DHH individuals face stigmatization due to hearing loss (Baldridge & Kulkarni, 2017) which affects the mental health of their well-being, social interaction, dysfunctional behaviours and negative consequences of hearing loss including education, family life, and employment during our lives (Newman & Newman, 2016). The life-course viewpoint, related to social function theory, focuses on the "social clock" suggests where people "should be" in school, higher education, their job, and parenthood may feel embarrassed with the diagnosis of hearing loss because it is known as generally affect adults 60 years and older age (Amieva, Ouvrard, Meillon, Rullier, & Dartigues, 2018; Blazer & Tucci, 2018). The second scientific method used is the social function theory presents a way of thinking about the relations between personal growth and the social world (Newman & Newman, 2016) that defines "age norms" and "age roles" as structures for individuals of various age classes, setting principles set standards of how a person should act depending on the age, occupation, ethnicity, socio-economic status, and skill. That, sudden entrance into new positions when diagnosed with hearing loss at a younger age, adults aged 21-50 suffer more emotional distress with a feeling of stigmatization (Baldridge & Kulkarni, 2017).

Hearing Loss and Mental Health

There has been numerous implication of Hearing impairment on psychological, emotional and social well-being, social interaction (Lucas, Katiri and Kitterick, 2017), mental health (Lawrence et al., 2019) leading to social communication uncomfortable, isolation from social obligations with a sense of alienation and depression (Strawbridge et al., 2000; Weinstein & Ventry, 1982). Impaired communication limited involvement in group interactions, diminished social role fulfilment satisfaction and social network management concerns (Kramer et al., 2002; van Groenou, Hoogendijk, & van Tilburg, 2013), depression and emotional disturbance (Gopinath et al., 2012; Kramer, Kapteyn, Kuik, & Deeg, 2002; Saito et al., 2010). Low psychosocial well-being is the upshot of an inability to

learn or deal adequately with hearing loss which impacts everyday lives and social life (Andersson, Melin, Lindberg, & Scott, 1996).

Chia and colleagues (2007) found that hearing loss of older age-related social success levels that general well-being of older hearing-impaired people embraces their hearing loss being a normal part of the ageing process (Nachtegaal, Festen, & Kramer, 2012; Tambs, 2004). Studies found that untreated hearing loss results in social exclusion, cognitive impairment, feelings of incompetence, and higher levels of occupational depression among DHHs between the ages of 13 and 70 (Baldridge & Kulkarni, 2017; Dawes et al., 2015; Stevenson et al., 2017). Some have conducted research among DHHs aged 60 and over on their socio-emotional well-being including depression, social loneliness, cognitive impairment, and self-stigmatization (Amieva et al., 2018, Castiglione et al., 2016; David, Zoizner, & Werner, 2018; Uchida et al., 2019) but very limited findings which suggested that more need of research for prevention and intervention.

Most of the research findings mainly concentrated among older adults DHH 60 years and above (Dawes et al., 2015; Heffernan, Habib & Ferguson, 2019), use small sizes but still through light on the prevalence of stigmatization, low self-esteem, social alienation and economic stress (Arslan, Aydemir, Kaya, Arslan & Durmaz, 2018; Michael, Attias & Raveh, 2019; Michael & Zaidan, 2018; Xiang, An, Kang, Stagg, & Ehrlich, 2020) which affected all age groups; also happened physical changes due to anxiety, stress, fatigue, social alienation, and social-emotional wellbeing but more common in older people (Arslan et al., 2018) with more adverse attitudes and actions when they are diagnosed with hearing loss in young adults DHH (Newman & Newman, 2016) accompanied by financial tension, social-emotional wellbeing and the desired access audiologists is intensified (Kochkin, 1993; Powell, Jacobs, Noble, Bush, & Snell-Rood, 2019).

Research evinced that the behavioural health factors (anxiety, depression, self-esteem, and well-being) of young and middle-aged people were more positively correlated with hearing loss than among older adults; and a higher number of socially alienated cases in younger participants than older participants (Hawthorne, 2008) as a primarily age-related effect on auditory system degeneration (presbycusis) (Hogan, Phillips, Brumby, Williams, & Mercer-Grant, 2015) but moderated by age,

ethnicity, socioeconomic status, partner status, hearing aid use, and comorbid conditions (Chen, 1994; Ives, Bonino, Traven, & Kuller, 1995; Nachtegaal et al., 2009; Pronk et al., 2011).

Research among adults over the age of 18 found that those with hearing loss exhibited signs of anxiety than normal hearing(Shoham, Lewis, Favarato, & Cooper, 2019) and corrective surgery significantly reduced that anxiety levels (Shoham et al., 2019); hearing loss with anxiety are more at risk of severe mental health disorders (Abbas et al., 2019); child hearing impact in their adult mental health and that has a substantial association with anxiety and low self-esteem among women aged 20-39 years of age (Idstad et al., 2019) but no considerable results found among male.

Research findings portrayed that deaf or hard of hearing deal with anxiety impair their lives beyond day-to-day tasks (Ariapooran, 2017), disturbed sleep habits (Clarke, Hoare, & Killan, 2019), high-stress occupations, social anxiety, depression, and agitation (Shoham et al., 2019), social anxiety/social phobia (Eleuteri et al., 2010), and lower levels of social functioning, higher levels of paranoia, phobic anxiety, paranoid ideation, social phobia, concern for self-appearance and interpersonal insensitivity (Eleuteri et al., 2010).

Dehnabi, Radsephehr, and Foushtanghi (2017) explored persons with deafness were lower in communication, muscle relaxation, general relaxation, and breathing exercises than persons with normal hearing.

Hearing loss people have an elevated risk of depression (Abbas et al. 2019; Eleuteri et al., 2010; Knutson, Johnson, & Murray, 2006; Kobosko et al., 2018) coupled with feelings of hopelessness, irritability, difficulties focusing, and exhaustion (NIMH, 2018) that affected their coping physical, behavioural, social, and emotional changes (Akram, Batool & Bibi, 2019; NIMH, 2018; Wallhagen, 2019), their depression reduced their quality of life (Ahmed et al., 2020). Some researchers also confirmed earlier findings that hearing loss and tinnitus caused psychological pain, including depression, anxiety, stress and mood swings (Abbas et al., 2019; Chepesiuk, 2005), not have a substantial impact on older people but affected isolation (Dawes et al., 2015; Pronk, Deeg, & Kramer, 2013), that depression impact was one-tenth of older adults are affected on their hearing, vision, cognition, mobility (Xiang et al., 2020). The DHH often feel isolated resulting in

poorer mental health (Dawes et al., 2015; Heffernan et al., 2019), increased levels of social introversion and loneliness (Knutson et al., 2006) though older with hearing loss struggle to engage in social activities (Reinemer & Hood, 1999). A study with hearing loss between the ages of 17 - 84 found increased levels of social introversion and loneliness (Knutson et al., 2006), social isolation characteristics (Heffernan et al., 2019), experience several physical changes resulting in social isolation and higher depressive levels among aged 20-58 years (Arslan et al, 2018), not available any prescribes techniques to facilitate socialization (Hay-McCutcheon et al., 2018; Zaidman-Zait, Most, Tarrasch, Haddad-eid, & Brand, 2016).

Hearing Loss and Intelligence

Intelligence is a composite framework of multiple influences including age, level of education, social level, environmental stimuli, parental education level and genetics (Nisbett et al., 2012) which are usually considered in test validation, and the same to be included for intelligence evaluation for the deaf community (Kushalnagar et al., 2007; Krouse & Braden, 2011) because of communication, adaptive behaviour, functional outcome and cognition are very common characteristics for them (Mayberry, 2002; Kushalnagar et al., 2007). Accordingly, studies that compared the age and sex of children with cochlear implants and normal-hearing peer's differences in cognitive abilities such as intellect, and academic achievement; and found that deaf children received poorer grades in crystallized intelligence measures which suggests that cognitive output is associated with good learning and acquisition of academic abilities in natural hearing, and the same results were found among cochlear implants (Huber & Kipman, 2012).

Greenberger (1899) developed methods for assessing hearing-impaired children's intelligence, a momentous and unique accomplishment. There has been a significant rise in psychiatric investigations of the hearing impaired over the past 25 years. This contained examinations of personality accomplishment in these persons and other traits. However, the primary focus was on intelligence testing by non-language group paper-and-pencil assessments and performance scales (Pintner, Eisenson, & Stanton, 1941).

The greatest number of research studies in this field partly depend on intelligence and conceptual skills, psychological assessments to assess intelligence

are inadequate because measuring language deficits than intelligence deficiencies (Myklebust, 1954; Vernon, 1976), and nonverbal performance assessments provide better valid intelligence indicators (Vernon & Brown, 1964). Research studies suggest that (a) intelligence when nonverbal IQ scales are used (McConnell, 1973, Vernon, 1967), (b) relatively few IQs were observed in the hearing impaired (Pronovost, Bates, Clasby, Miller, & Thompson, 1976), and (c) growing of thought processes and unique forms of thinking are similar to hearing peers (Altshuler, 1974; Furth & Youniss, 1971; Moores, 1978; Youniss, 1974); hearing impaired showed deficiency on digit duration, image span, memory, and memory for motion (Myklebust, 1960), weaker with digits, lower verbal language intelligence but same on ludicrous types of visual memory span measures (Olsson & Furth, 1966), reasoning and inference intelligence (Furth, 1973.

Vernon (1968) mentioned the lack of a consistent relation between type of hearing loss, degree of hearing, onset, and age level with the level of intelligence. Some research evinced mixed findings that a positive connection between performance and school achievement (Birch et al., 1963), closely the distribution of performance (Brill, 1962), and no inferiority due to hearing loss (Furth, 1966; Darbyshire, 1965).

Mizoram Scenario:

Mizoram represents just 0.09 per cent of the total population of India and ranks 29th among all the States and UTs of India in terms of population. Mizoram has a 91.33 per cent literacy rate and holds 3rd rank in India. Mizoram State has an area of 21,081 sq. Km. The Person with Disabilities (Equal Opportunity, Protection of Rights and Full Participation) Act, 1995 was introduced in Mizoram on 2nd February 1996, and the Mizoram Persons with Disabilities (Equal Opportunity, Security of Rights and Full Participation) Rules were notified in 1999 (under vide Gazette Notification No. H.13016/20/97-SWD dated 12th August 1999.

The population of Mizoram is 10,97,206 as per the 2011 Census and was estimated the population of persons with disabilities contributed 15,160 out of the total population (1.38 per cent), about 3,354 hearing-impaired adults out of the total population of individuals with disabilities. The social welfare department of the

Mizoram Government-issued disability certificates and ID cards issued in the state was 10,134, which is 67 per cent of the estimated PWD population in the state.

Spastics Society of Mizoram was established by the parents of four children with disabilities to support each other and also assist other parents, and registered under the Societies Registration Act (Extension to Mizoram) of 1976 on 10 April 1989. The Gilead Special School also opened to specifically address the needs of the children of MR (Mentally Challenged) and CP (Cerebral Palsy) on 1st February 1990. The National Programme for Prevention and Control of Deafness (NPPCD), starts functioning in Mizoram in August 2014 for prevention, early identification, diagnosis and treatment of hearing loss, rehabilitation, and development of institutional capacity for ear care services and to serve the state.

The statement of the problem for the present study is presented in the next chapter: Chapter –II: The statement of the problem.

Chapter – II

STATEMENT OF THE PROBLEM

More than 5% of the world's population, i.e. 466 million people, has disabling hearing loss, comprising 432 million adults and 34 million children, according to the World Health Organisation (2020). WHO predicted that thirty years from now, there will be a debilitating hearing loss for one of every ten individuals, i.e. over 900 million individuals. While about half of childhood deafness cases result from birth (Action on Hearing Loss, 2011; Middleton, Emery & Turner, 2010; Morton & Nance, 2006), hearing loss can also be influenced by age-related declines in adulthood.

Many recent findings have indicated a high prevalence of mental health problems in deaf people in many countries (Fellinger, Holzinger & Pollard, 2012; Van Gent, Goedhart, Hindley & Treffers, 2007). Studies have found that almost half of the deaf community had mental health issues in their lives (Fellinger, Holzinger, Sattel, Laucht & Goldberg, 2009). Deaf and hard-of-hearing (DHH) individuals have a higher incidence of mental health issues, but the provision of deaf and hard-of-hearing mental health facilities is also very low. Owing to communication gaps and socioeconomic influences, they are segregated from the listening world.

Several factors have resulted in a high prevalence in the deaf community with mental health issues. Such causal deafness factors, whether inherited or congenital, can lead to differences in brain function that make a person more prone to mental health issues (Brown, Cohen, Greenwald & Susser, 2000; Middleton, Emery & Turner, 2010; Morton & Nance, 2006). Deaf people with comorbidities are more likely to have mental health issues and have encountered cognitive and behavioural challenges, thus reducing their well-being (DOH, 2005; Hindley, 2005). Hearing loss in children can affect the parent-child relationship and attachment problems because of communication difficulties (Meadow-Orlans 1990). About 95% of deaf children emerge from hearing communities or hearing parents who are inexperienced with deafness and therefore have no sign language experience (Hindley, 2005; Meadow-Orlans & Erting, 2000; Horne & Pennington, 2010; Brauer, Braden, Pollard & Hardy-Braz, 1998), adding to communication problems. These communication problems triggered social isolation and restricted contact that impaired emotional maturity (Hindley, 2000; 2005; Horne & Pennington, 2010; Brauer et al., 1998), leading to a limited comprehension of the feelings of others,

limited vocabulary and consequential thoughts (Gray, Hosie, Russell & Ormel, 2003; Hindley, 2005; Remmel, Bettrer & Weinberg, 2003). Such barriers have not only impacted interactions and social isolation but also decreased self-esteem, education and job prospects, thereby impacting mental health and well-being (Fellinger et al., 2009; Ridgeway, 1997). In contrast to hearing adults of comparable age groups, DHH people are more prone to risk factors that correlate to problems in growth and conduct, including risk factors such as academic difficulty, low self-esteem, weak control, and sexual/physical violence (Black and Glickman 2005; Simeonsson et al. 2001). Poor communication skills are associated with poor psychosocial functioning that significantly restricts access to medical care (Black and Glickman 2005).

Many DHH people between the ages of 21 and 50 have unhealthy assumptions regarding their condition and are ignorant of the long-term effects of untreated hearing loss (Hunter, 2018; Idstad, Tambs, Aarhus, & Engdahl, 2019). Owing to societal expectations that hearing loss generally impacts only older adults, young and middle-aged DHH individuals also face stigma (Baldridge & Kulkarni, 2017). Research study reports that many young people have difficulty accepting their situation, struggle with stigma and are unable to grasp the effects of long-term exposure to noise on their future (Eberts, 2018; NAHIC, 2014). When young and middle-aged individuals are diagnosed with hearing loss, many may feel ashamed since hearing loss is commonly considered to affect the elderly (Amieva, Ouvrard, Meillon, Rullier, & Dartigues, 2018; Blazer & Tucci, 2018). Since hearing loss can occur at any time during a person's life, young and middle-aged individuals experience emotional distress when diagnosed with hearing loss at a younger age and often deal with the stigma of hearing loss (Baldridge & Kulkarni, 2017). This highlighted the importance of research that examines hearing loss in youth and middle-aged people. Any of the psychological mechanisms that may explain dysfunctional attitudes and detrimental effects of hearing loss in young and middle-aged people include emotional health and well-being and social participation.

The hearing disorder has had several effects on mental, emotional and social well-being and has also compromised social interaction (Lucas, Katiri and Kitterick, 2017). Lawrence and his colleagues (2019) emphasized in his new meta-analysis of 35 studies that there is indeed an association among adults between hearing loss and certain aspects of mental health. Hearing problems caused expression problems that

make social interaction challenging, leading to detachment from social commitments and thus a feeling of loneliness and depression (Strawbridge et al., 2000; Weinstein & Ventry, 1982). Impaired communication inevitably resulted in reduced engagement in group activities, lowered satisfaction with social role fulfilment and questions about social network management (Kramer et al., 2002; van Groenou, Hoogendijk, & van Tilburg, 2013). Many research studies have shown that poor mental health is associated with decreased functional hearing when conditions such as stress and emotional illness are taken into consideration (Gopinath et al., 2012; Kramer, Kapteyn, Kuik, & Deeg, 2002; Saito et al., 2010). Chia et al. (2007) discovered that hearing loss was linked to lower levels of social performance. Social experiences are often important for the overall well-being of older people with hearing impairments, but this group may tolerate their hearing loss more by associating it with being a natural part of the ageing process (Nachtegaal, Festen, & Kramer, 2012; Tambs, 2004) and thus the consequences of having trouble communicating. Poor effects of psychosocial well-being following hearing impairment appear to result from an inability to learn or cope effectively with hearing loss and therefore it affects daily life and social life (Andersson, Melin, Lindberg, & Scott, 1996). Usually, for younger and older individuals, the aetiology of hearing loss varies. While congenital hearing loss is typically due to genetic problems, acquired hearing loss is mostly due to age-related degeneration of the auditory system (presbycusis) (Hogan, Phillips, Brumby, Williams, & Mercer-Grant, 2015).

Few studies have examined the relationship between hearing loss and some measures of age-related social-emotional well-being from early to middle adulthood. Studies have also shown that untreated hearing loss in people between the ages of 13 and 70 will result in social isolation, cognitive disability, feelings of incompetence, and higher levels of workplace depression (Baldridge & Kulkarni, 2017; Dawes et al., 2015; Stevenson et al., 2017). For people aged 60 and over, the direct correlation between hearing loss and an individual's socio-emotional well-being (depression, social isolation, cognitive disability, and self-stigmatization) has been extensively studied (Amieva et al., 2018, Castiglione et al., 2016; David, Zoizner, & Werner, 2018; Uchida et al., 2019). Much of the study published so far on hearing loss and social-emotional well-being focuses predominantly on older adult adults, identified

as aged 60 and over (Dawes et al., 2015; Heffernan, Habib & Ferguson, 2019). Most studies use small sizes, varying from 10 to 300 individuals, and a few exceptions, with a variety of age groups, ranging from 6-year-old children to adults in their 70s. Previous results have shown that the literature on hearing loss and socio-emotional well-being addresses stigma, poor self-esteem, social isolation and economic hardship for this age group (Arslan, Aydemir, Kaya, Arslan & Durmaz, 2018; Michael, Attias & Raveh, 2019; Michael & Zaidan, 2018; Xiang, An, Kang, Stagg, & Ehrlich, 2020). The most common factors found in older adults with hearing loss are noticeable symptoms due to anxiety, depression, exhaustion, social isolation, and social-emotional health (Arslan et al., 2018). The hearing disorder is attributed to economic hardship, social-emotional well-being is affected and the need to be open to audiologists is increased (Kochkin, 1993; Jacobs, Noble, Bush, & Snell-Rood, 2019).

Previous studies have shown that age, race, educational status, partner status, use of hearing aids, and comorbid disorders moderate the association between hearing status and psychosocial well-being (Chen, 1994; Ives, Bonino, Traven, & Kuller, 1995; Nachtegaal et al., 2009; Pronk et al., 2011). In Tambs's (2004) analysis of men and women aged 20 to 44 years, 45 to 64 years, and over 65 years, the link between hearing loss and self-reported mental health consequences, including anxiety, depression, self-esteem, and well-being. Overall, the study found that young and middle-aged individuals' mental well-being factors were associated more positively with hearing loss than among older adults. In younger participants aged 15-30 years, Hawthorne (2008) found a larger number of socially alienated cases compared to older participants over 60 years.

A survey review on the relationship between hearing loss and social-emotional well-being in studies of adults over the age of 18 shows that those with hearing loss were more likely to have or display symptoms of anxiety than those without hearing loss (Shoham, Lewis, Favarato, & Cooper, 2019). Also, it was found that anxiety levels declined considerably if participants underwent corrective surgery to restore their hearing loss (Shoham et al., 2019).

A longitudinal study of 100 adults between the ages of 18 and 60 performed by Abbas et al. (2019) found that participants with hearing loss are more likely to be

at risk of serious mental health disorders, especially anxiety. Idstad and colleagues (2019) examined childhood hearing loss relative to their adult mental health and observed a significant correlation in women aged 20-39 years between mild hearing loss and anxiety and poor self-esteem. However, Idstad and colleagues (2019) did not find any significant differences when examining childhood hearing loss and adult mental wellbeing in men.

Individuals with hearing loss are also much more likely to deal with physical problems associated with anxiety, such as disrupted sleeping habits, in addition to mental health concerns (Clarke, Hoare, & Killan, 2019). Clarke and colleagues (2019) found that disrupted sleep patterns can result from several types of hearing loss-related anxiety in adults 18 years or older, including auditory deprivation, communication anxiety, anxiety associated with high-stress jobs, and social anxiety associated with a person's age, current hearing status, and depression.

In research conducted by Eleuteri and colleagues (2010) adults between the ages of 18 and 65 years, hearing impairment was strongly related to lower levels of social functioning and reported that DHH individuals have marginally lower levels of social functioning and higher levels of fear, phobic anxiety, paranoid ideation, social phobia, self-appearance concern and interpersonal insensitivity.

Another research undertaken by Xiang and colleagues (2020) showed that adults aged 50 or over with hearing loss are found to be more likely to suffer depression. People with hearing loss also feel alone, leading to poorer mental health (Dawes et al., 2015; Heffernan et al., 2019). People aged 50 or older with hearing loss have failed to participate in social activities (Reinemer & Hood, 1999). Increased levels of social introversion and isolation were found in a sample of people with hearing loss between the ages of 17 and 84 (Knutson et al., 2006). There are also many physical changes in individuals living with sudden unilateral hearing loss, including vertigo and tinnitus, which can lead to social alienation and greater depression levels in people aged 20-58 years (Arslan et al, 2018). If adults with hearing loss are not provided with the information to encourage appropriate social interaction, it could exacerbate the isolating nature of being deaf or hard of hearing (Hay-McCutcheon et al., 2018; Zaidman-Zait, Most, Tarrasch, Haddad-eid, & Brand, 2016).

The importance of intelligence testing in the DHH population can be based on the fact that the research suggests associations between speech, adaptive behaviour, functional outcome, and cognition in deaf persons (Mayberry, 2002; Kushalnagar et al., 2007). Huber and Kipman (2012) tested assessed cognitive capabilities among DHH people, including intellect and academic performance, and found that in crystallized intelligence tests, deaf children earned lower scores. Cognitive capacity has also been found to have a strong correlation with academic achievement.

As language deficits are assessed rather than intelligence defects, psychological tests based on the use of verbal language to test intelligence are insufficient (Myklebust, 1954; Vernon, 1976). Rather, nonverbal performance tests offer the most relevant intelligence indicators for this population (Vernon & Brown, 1964). Studies show that where nonverbal IQ scales are used, the distribution of hearing deficient intelligence is the same as that of the hearing population (McConnell, 1973, Vernon, 1967). Comparatively few IQs below the 90s were found among the hearing impaired (Pronovost, Bates, Clasby, Miller, & Thompson, 1976), and they develop intellectually in their thought processes and special ways of reasoning in a way that is similar to hearing peers (Altshuler, 1974; Furth & Youniss, 1971; Moores, 1978; Youniss, 1974).

The hearing impaired are inferior to hearing subjects for certain intellectual assignments but equal or superior in others; Poorer with digits, but comparable to absurd types of measurements of visual memory span (Olsson & Furth, 1966), lower intelligence of verbal words, but similar to logic and intelligence of inference (Furth, 1973). Using two different approaches, Furth (1966) and Darbyshire (1965) tested hearing deficient persons on Piagetian tasks and observed that the hearing impaired were not inferior to the hearing participants with enough time to complete tasks.

As previously mentioned in chapter-I, there are 3,354 hearing-impaired adults in Mizoram as per the 2011 Census of India. Also, the prevalence of mental problems in the state, like the rest of the country, is quite high. Apart from a few private mental health practitioners, the Government of India had launched National Mental Health Programme (NMHP) to ensure the availability and accessibility of mental healthcare for the vulnerable and underprivileged sections of society. In Mizoram, the District Mental Health Programme was launched under NMHP to tackle the same objective and provide Community Mental health services. However, for the hearing impaired sections of the society, who are requiring mental health services more than the normal-hearing population, the services rendered to them are insufficient due to incompetent service availability or difficulty in communicating with them. It is believed that these hindrances would cause more mental health problems and affect these populations and would consequently affect their wellbeing.

The present study, therefore, will highlight and compare the level of mental health and well-being of the deaf and hard of hearing individuals in Mizoram, India and also compare the level of intelligence of the Deaf and Hard of Hearing (DHH) individuals with the hearing individuals in the adult population age ranging 20 years to 65 years. The Mental Health Continuum – Short Form (MHC-SF) and General Health Questionnaire – 28 were used to evaluate the level of mental health, wellbeing and mental illness, and Raven's Standard Progressive Matrices was used to assess intelligence. The psychological measures included emotional well-being, social well-being, psychological well-being, anxiety, insomnia, somatic symptoms, severe depression and fluid intelligence. The effects of age, gender and hearing abilities on mental health and intelligence factors will be investigated. The present research is intended to lead to a deeper understanding of some of the psychological dimensions of the Deaf and Hard of Hearing, which will include the relevance of the psychological aspect for the DHH intervention strategy proposal.

Objectives of the study:

Based on the theoretical foundations and available literatures, the following objectives were framed for the present study entitled "Mental Health Factors and Intelligence among Deaf and Hard of Hearing Individuals" as follows:

1) To explore the level of Mental Health and Intelligence among the comparision groups.
2) To examine the Gender differences on the selected dependent variables under study.
3) To examine the Age Group differences on the selected dependent variables under study.
4) To explore any significant relationship between the selected dependent variables of the present study.
5) To determine the independent effect of Hearing ability, Gender and Age group on Mental Health and Intelligence among the samples.
6) To delineate the interaction effect of 'Hearing ability, Gender and Age' in the selected dependent variables among the population under study.
7) To evaluate the Intelligence prediction on Mental Health variables.

Hypothesis:

Considering the objectives set forward, the following hypotheses were proposed:

1) The level of mental well-being (Emotional Well-being, Social Well-being, Psychological Well-being) among DHH individuals will be significantly lower when compared to normal hearing.
2) The level of mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression) among DHH individuals will be significantly higher when compared to normal hearing.
3) Normal-hearing individual will perform significantly higher than DHH individuals on cognitive abilities (Intelligence).
4) It was expected that Female will have significant higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression when

compared to males but significantly lower on emotional, social and psychological wellbeing and intelligence.

5) It was expected that Young adults will have significantly higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults but significantly lower levels of emotional, social and psychological wellbeing and intelligence.
6) It was expected that there will be a significant positive / negative correlation among the dependent variables.
7) 'Hearing Ability, 'Gender' and 'Age group' will have a significant independent effect on Emotional Well-being, Social Well-being, Psychological Well-being, Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, Severe Depression and Intelligence.
8) 'Hearing Ability, 'Gender' and 'Age group' will have a significant interaction effect on Emotional Well-being, Social Well-being, Psychological Well-being, Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction. Severe Depression and Intelligence.
9) It was expected that level of Intelligence will predict Emotional Well-being, Social Well-being, Psychological Well-being, Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, Severe Depression and Intelligence.

The methodology followed in the present study was presented in the next chapter- Chapter-III: Methods and Procedure.

Chapter – III

METHODS AND PROCEDURE

Sample

Three hundred and twenty (320) participants, comprising 160 DHH {80 females (40 Young Adults and 40 Middle Adults) and 80 males (40 Young Adults and 40 Middle Adults)} and 160 Normal hearing {80 females (40 Young Adults and 40 middle adults) and 80 males (40 Young Adults and 40 Middle Adults)} of the age group 20 to 39 years (Young Adults) and 40 to 59 years (Middle Adults) were selected to serve as samples and selected through multistage sampling procedure from different parts of Mizoram. The age range was 20-59 years of age, which was classified into two age groups: Young Adult (20-39 years) and Middle Adult (40-59 years), categorization was done based on Erikson's stages of psychosocial development (Erikson, 1950).

Participants for the Hearing Impaired were identified from the lists of PwD obtained from the Social Welfare Department, Aizawl, National Institute of Orthopedically Handicapped (NIOH), Aizawl and Hearing and Speech Centre, Aizawl and were randomly selected for equal distribution of Gender and Age Group. A variety of subject demographic details such as age, gender, marital status, educational qualification, occupation and average monthly income were documented to equate with the normal hearing sample; and to match the representation of all demographic characteristics of the hearing impaired participants, samples were chosen for normal hearing subjects.

Design

To meet the objectives of the study, a 2 x 2 x 2 factorial design (2 Hearing abilities x 2 Gender x 2 Age groups) was employed. The samples were categorised into eight comparison groups, each group containing 40 subjects (eights groups): DHH Female Young Adult (DHHFYA), DHH Female Middle Adult (DHHFMA), DHH Male Young Adult (DHHMYA), DHH Male Middle Adult (DHHMMA), Normal Hearing Female Young Adult (NHFYA), Normal Hearing Female Middle Adult (NHFMA), Normal Hearing Male Young Adult (NHMYA) and Normal Hearing Male Middle Adult (NHMMA) as shown in ***Figure-1***.

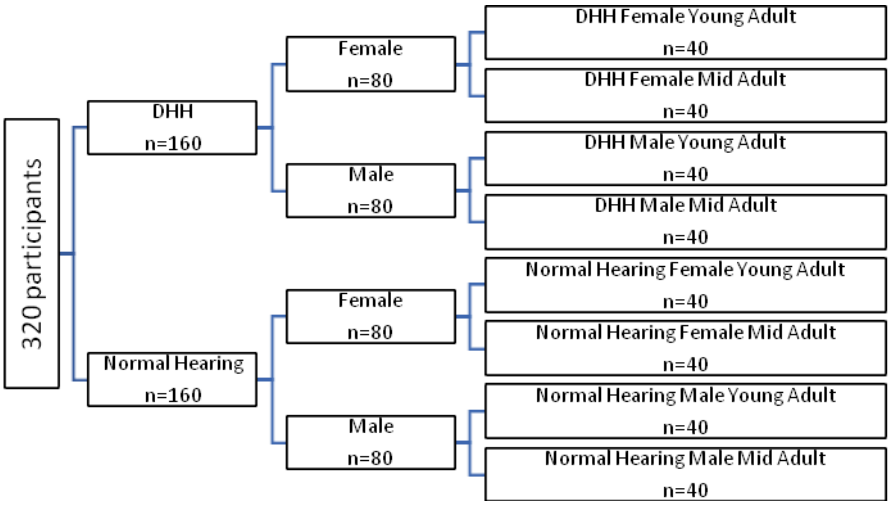

Figure- 1: 2 x 2 x 2 Factorial Design (2 hearing abilities x 2 gender x 2 Age group) of the study.

Psychological Tools

To achieve the objectives of the study, the present study employed three psychological measures: (i) Mental Health Continuum – Short Form (MHC – SF; Keyes, 2005), (ii) General Health Questionnaire – 28 (GHQ – 28; Goldberg, 1978) and (iii) Raven's Standard Progressive Matrices (SPM; Raven et al., 1992) to evaluate their psychological condition. The psychological measures incorporated in this study are described below for a clear understanding of the several components or variables of interest in the study:

1) Mental Health Continuum – Short Form (MHC – SF; Keyes, 2005). Keyes developed the original 14-item Mental Health Continuum-Short Form (MHC-SF; Keyes, 2005) in response to demands for brief self-rating assessment tools that combined the three well-being components: *emotional, social, and psychological*. The emotional well-being subscale –EWB– (three items) is defined in terms of positive affect/ satisfaction with life. Social well-being –SWB– is assessed with five items that represent each aspect of the model described by Keyes (1998): social contribution, social integration, social actualization, social acceptance, and social coherence. Finally, six items represent each of the dimensions of psychological well-being –PWB– as described in Ryff's model (Ryff, 1989): self-acceptance, environmental mastery, positive relations with others, personal growth, autonomy, and purpose in life. Participants were required to respond to items on a 6-point Likert-type scale based on the experiences they had had over the last month (never,

once or twice, about once a week, 2 or 3 times a week, almost every day, or every day). The MHC-SF had shown excellent internal consistency (> .80) and discriminant validity in adults in the U.S, the Netherlands, and South Africa (Keyes, 2005b, 2006; Keyes et al., 2008; Lamers et al., 2011; Westerhof & Keyes, 2009). Low scores indicate 'languishing' whereas high scores indicate 'flourishing'.

2) General Health Questionnaire – 28 (GHQ-28; Goldberg, 1978). The GHQ-28 was developed by Goldberg in 1978 (Goldberg 1978) as a screening tool to detect those likely to have or to be at risk of developing psychiatric disorders, the GHQ-28 is a 28-item measure of emotional distress in medical settings. Through factor analysis, the GHQ-28 has been divided into four subscales. These are *somatic symptoms* (items 1–7); *anxiety/insomnia* (items 8–14); *social dysfunction* (items 15–21), and *severe depression* (items 22–28) (Goldberg 1978). Each item is accompanied by four possible responses: 'Not at all, 'No more than usual, 'Rather more than usual, and 'Much more than usual. There are different methods to score the GHQ-28. It can be scored from 0 to 3 for each response with a total possible score ranging from 0 to 84. Using this method, a total score of 23/24 is the threshold for the presence of distress. Alternatively, the GHQ-28 can be scored with a binary method where 'Not at all, and 'No more than usual' score 0, and 'Rather more than usual' and 'Much more than usual' score 1. Using this method any score above 4 indicates the presence of distress or 'caseness'.

3) Raven's Standard Progressive Matrices (SPM; Raven et al., 1992). The Standard Progressive Matrices (SPM) was developed to test the ability of a person to form perceptual relationships and to reason outside of language and formal learning through comparison, and can be used for individuals from 6 years of age to adulthood. It is the first and most widely used of three instruments known as the Raven's Progressive Matrices, the other two being the Coloured Progressive Matrices (CPM) and the Advanced Progressive Matrices (APM). All three tests are measures of Spearman's g and a performance test of intelligence. The SPM consists of 60 items arranged in five sets (A, B, C, D, & E) of 12 items each. Each item contains a figure with a missing piece. Below the figure are either six (sets A & B) or eight (sets C through E) alternative pieces to complete the figure, only one of which is correct. Each set involves a different principle or "theme" for obtaining the missing piece, and within a set, the items are roughly arranged in increasing order of

difficulty. The raw score is typically converted to a percentile rank by using the appropriate norms.

4) Demographic Profiles. Background profiles of the subject including age, gender, marital status, educational qualification, occupation, average monthly income, details of hearing loss (type, age of onset, level), mode of communication (use of sign language), use of hearing aids, etc. were recorded.

Procedure

Initially, the researcher framed a demographic profile that included all the necessary information about the participants for the study. Standardised psychological tools to be used in the present study such as Mental Health Continuum – Short Form (MHC – SF; Keyes, 2005), General Health Questionnaire – 28 (GHQ – 28; Goldberg, 1978) and Raven's Standard Progressive Matrices (SPM; Raven et al, 1992) were collected. The two psychological tools (Mental Health Continuum and General Health Questionnaire) were translated into Mizo language and back-translated into the English language to elucidate the reliability of the translated scales as the pilot tests; the results in the pilot study confirmed the reliability of the psychological scales for the population under study. After completion of the checking of the psychometric adequacy of the selected psychological tests, identification of the samples was done following the design.

Firstly, 160 participants for the Hearing Impaired were identified from the lists of PwD obtained from the Social Welfare Department, Aizawl, National Institute of Orthopedically Handicapped (NIOH), Aizawl and Hearing and Speech Centre, Aizawl and were randomly selected for equal distribution of Gender and Age Group. A variety of subject demographic details such as age, gender, marital status, educational qualification, occupation and average monthly income were documented for cross-checking the good representation of hearing abilities, gender and age group of DHH. Secondly, 160 normal samples were identified to match the DHH samples on hearing abilities, gender and age by representing the normal hearing subjects for the study. All the necessary permission/consent of the subject/their carers was obtained for the conduction of the psychological tests.

The administration of the psychological scales was conducted in an individual setting for the ethical purpose of psychological assessment as prescribed

by the APA ethical code, 2014. Informed consent were taken from the participants, and rapport was also built with them. The need and purview of the research and the nature of confidentiality to be maintained were informed to each participant and their families. After taking their informed consent, the administrations of the psychological tests were administered. Each assessment session lasted approximately an hour. The researcher communicated with the DHH participants with the help of a hearing expert, through sign language or written form. The researcher then asked the subjects to complete the demographic profile that was only administered to the participants at the time.

Instructions needed for the conduct of the psychological tests were carefully provided to the selected participants. Then, the researcher administered psychological tools personally to the subjects. All the prescribed administration procedures laid down by each scale were strictly followed. The response sheet was carefully checked to detect any missing or incomplete answers before leaving the administration set. The participants were promised confidentiality about their response patterns.

Scoring was done after the complete completion of all questionnaires and further analysis was carried out. After careful screening of the responses and removal of outliers and incomplete responses, 320 responses comprising of equal distribution of participants from each comparison group were selected for the analysis.

Statistical Analysis

Subject-wise scores on items of the Mental Health Continuum – Short Form (MHC – SF; Keyes, 2005), General Health Questionnaire – 28 (GHQ – 28; Goldberg, 1978) and Raven's Standard Progressive Matrices (SPM; Raven et al., 1992) were separately prepared and analysed to check their psychometric adequacy for measurement purposes among DHH individuals and normal hearing individuals. IBM's Statistical Package for the Social Sciences (SPSS 26) was used for the data analysis.

Firstly, the psychometric adequacy of the two psychological tests was analysed and found Cronbach alpha and split-half reliability coefficient (of the

subscales and full scales) and inter-scale relationships relate to the constructs in the targeted population and employed for the present study for the collection of data.

Secondly, the mean and SD values were calculated for comparison of the test scores between the groups, and the Skewness and Kurtosis of both the scales and sub-scales to check the nature of the data distributions for further analysis. Levene's tests of homogeneity of variance and Browne- Forsythe Robust test of equality of variances were employed for choosing appropriate statistics; resulted showed parametric statistics may be used for further analysis.

Thirdly, Correlation was calculated to determine the relationship between the variables for the samples.

Fourthly, 2x2x2 factorial ANOVA with Post-hoc statistics was employed to examine the independent and interaction effects of Hearing Ability, Gender and Age on the dependent variables.

Finally, Regression analysis was employed to determine the prediction of Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression on Emotional Well-being, Social well-being and Psychological well-being variables for the whole sample.

Results of the study are presented in the next chapter-*Chapter IV: Results and Discussion.*

Chapter – IV

RESULTS AND DISCUSSION

Results and Discussion

The present study entitled *"Mental Health Factors and Intelligence among Deaf and Hard of Hearing Individuals"* aimed to study the prevalence and level of mental health conditions and cognitive ability among the hearing impaired along with gender and age level differences. The study focused on some of the factors of mental health such as emotional, social and psychological wellbeing; on the mental health problems such as somatic symptoms, anxiety/ insomnia, social dysfunction and severe depression; and on cognitive ability comparing their prevalence between the Deaf and Hard of Hearing (DHH) and normal hearing individuals; and to determine the independent effects and interaction effect of 'hearing ability, 'gender' and 'age group' on Emotional Well-being, Social Well-being, Psychological Well-being, Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, Severe Depression and Intelligence among the target population.

It was hypothesised that the level of mental well-being being (Emotional Well-being, Social Well-being, Psychological Well-being) among DHH individuals would be significantly lower, whereas mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression) among DHH individuals would be significantly higher when compared to normal hearing and that normal-hearing individuals would perform significantly higher than DHH individuals on cognitive abilities (Intelligence). It was also predicted that mental well-being (Emotional Well-being, Social Well-being, Psychological Well-being) would be significantly higher for males than females and vice versa for mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression); males will perform significantly higher on cognitive abilities (Intelligence) than females. It was expected that Young adults will have significantly higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults but significantly lower levels of emotional, social and psychological wellbeing and intelligence.. It was also hypothesised that 'hearing ability, 'gender' and 'age group' would have a significant independent effect and significant interaction effect on Emotional Well-being, Social Well-being, Psychological Well-being, Somatic Symptoms, Anxiety/Insomnia, Social

Dysfunction, Severe Depression and Intelligence in the target population. Cognitive abilities were projected to predict the level of Emotional Well-being, Social Well-being, Psychological Well-being, Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, Severe Depression and Intelligence.

To achieve the objectives and hypothesis of the study, three hundred and twenty (320) participants from different parts of Mizoram, a state in the northeast of India, comprising 160 DHH {80 females (40 young adults and 40 Middle adults) and 80 males (40 young adult and 40 middle adults)} and 160 Normal hearing {80 females (40 young adult and 40 middle adults) and 80 males (40 young adult and 40 middle adults)} of the age group 20 to 39 years (Young Adult) and 40 to 59 years (Middle Adult) were selected to serve as samples by employing multistage sampling procedure. The age range was 20-59 yrs which was classified into two age groups Young Adult (20-39 years) and Middle Adult (40-59 years) following the stages of psychosocial development proposed by Erikson (Erikson, 1950).

The design of the study was a 2 x 2 x 2 factorial design (2 Hearing abilities x 2 Gender x 2 Age groups). The samples were categorised into eight comparison groups, each group containing 40 subjects in each eights groups: DHH Female Young Adult (DHFYA), DHH Female Middle Adult (DHFMA), DHH Male Young Adult (DHMYA), DHH Male Middle Adult (DHMMA), Normal Hearing Female Young Adult (NHFYA), Normal Hearing Female Middle Adult (NHFMA), Normal Hearing Male Young Adult (NHMYA) and Normal Hearing Male Middle Adult (NHMMA).

The Mental Health Continuum – Short Form (MHC – SF; Keyes, 2005), General Health Questionnaire – 28 (GHQ – 28; Goldberg, 1978) and Raven's Standard Progressive Matrices (SPM; Raven et al, 1992) were employed for psychological evaluation of the samples, all prescribed instructions are given in the manuals and APA guidelines for research were followed.

Sample Characteristics

The sample was categorised based on their hearing abilities consisting of 160 DHH and 160 Normal hearing individuals. Each of these two groups consisted of 80 males and 80 females which are again equally categorised based on their age group into Young Adults and Middle Adults as seen in Figures 2 to 4. The whole sample is

distributed into eight equal comparison groups viz. DHH Female Young Adult (DHFYA), DHH Female Middle Adult (DHFMA), DHH Male Young Adult (DHMYA), DHH Male Middle Adult (DHMMA), Normal Hearing Female Young Adult (NHFYA), Normal Hearing Female Middle Adult (NHFMA), Normal Hearing Male Young Adult (NHMYA) and Normal Hearing Male Middle Adult (NHMMA), each group containing 40 subjects.

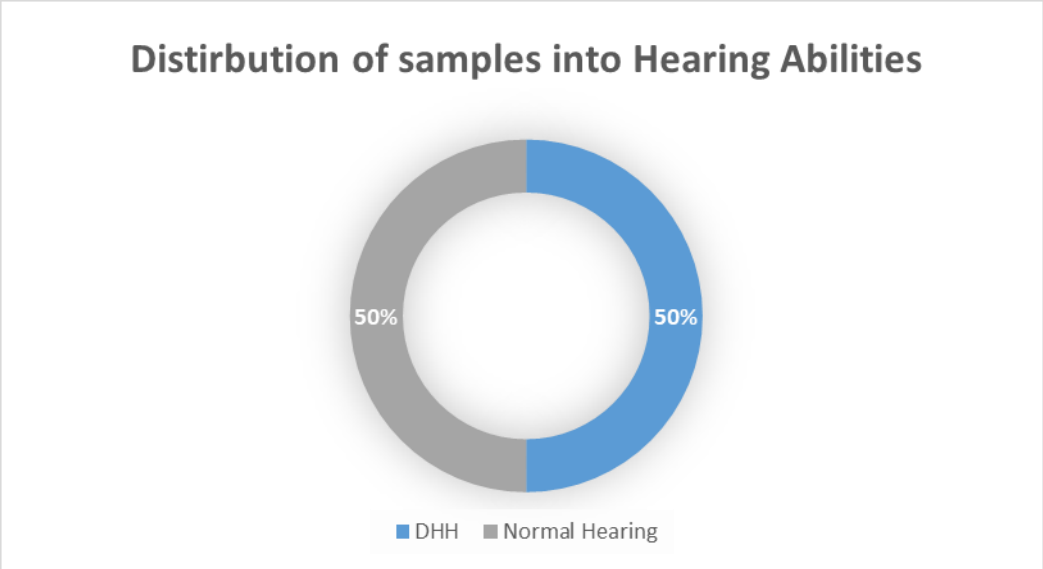

Figure 2. Distribution of samples into Hearing Abilities.

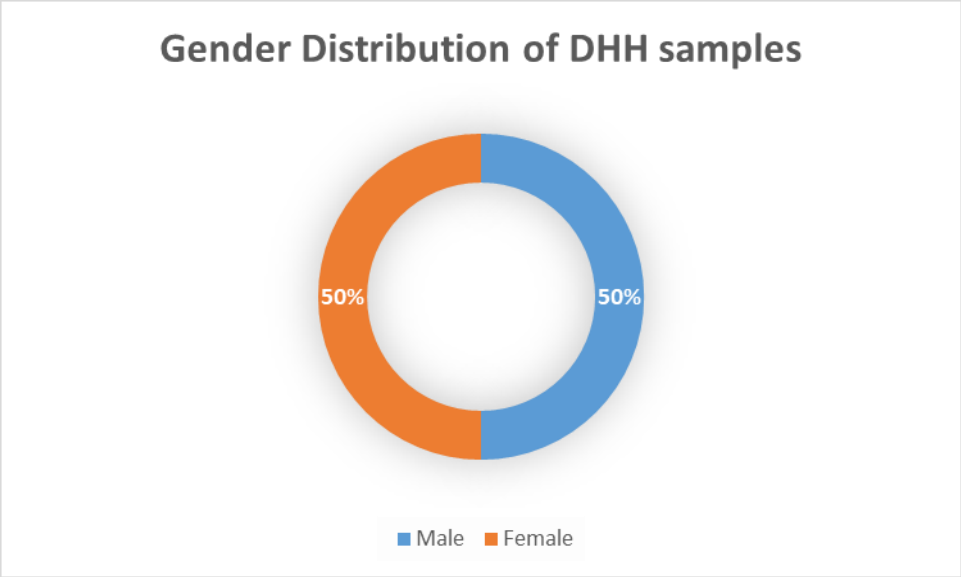

Figure 3. Gender Distribution of DHH samples.

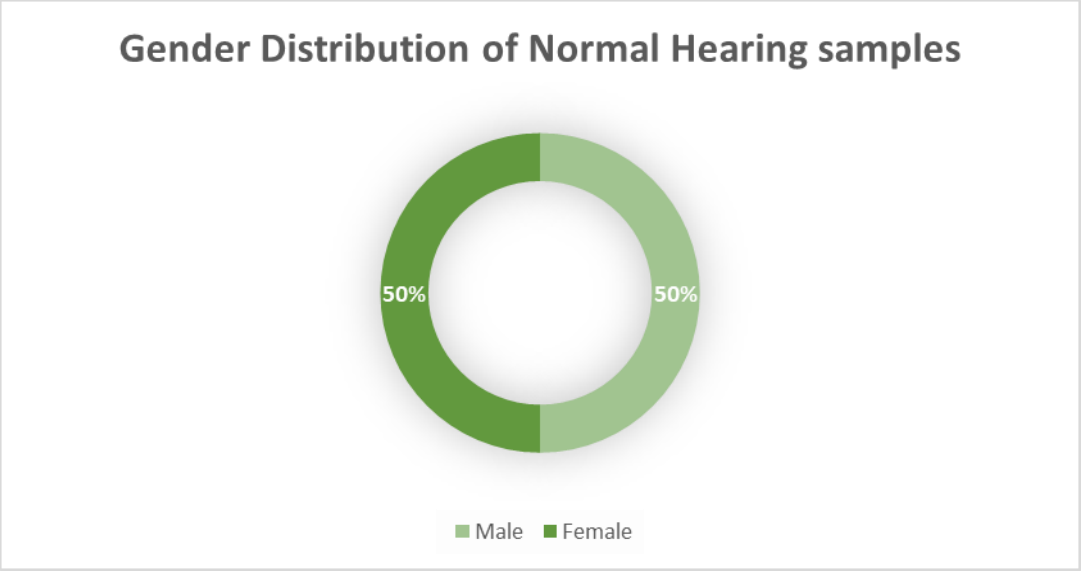

Figure 4. Gender Distribution of Normal Hearing samples.

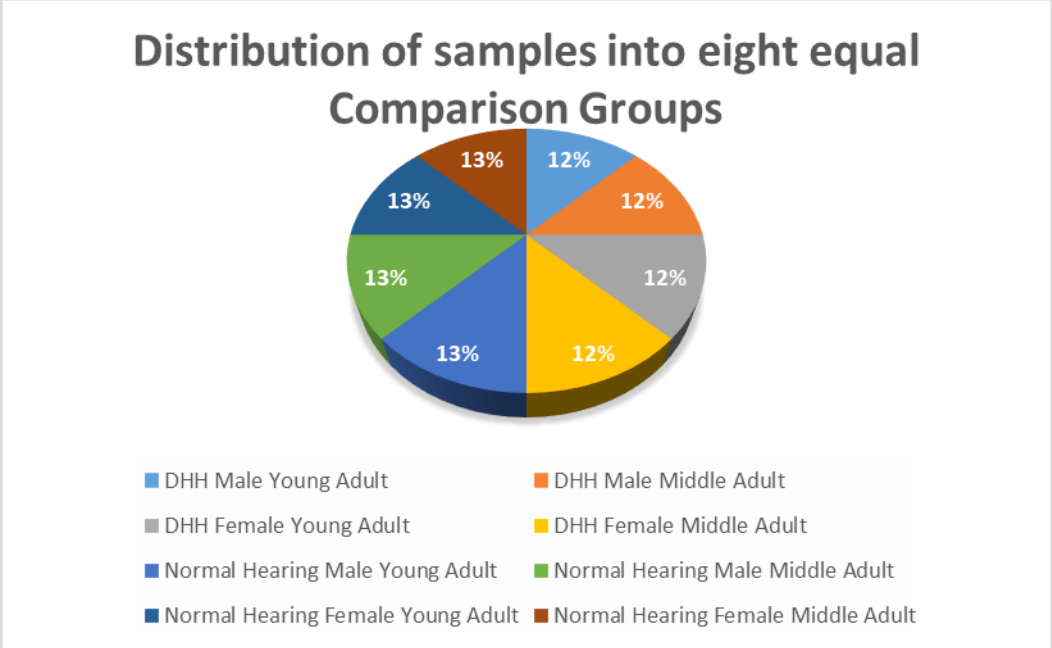

Figure 5. Distribution of samples into eight equal comparison groups.

Subject-wise scores on items of the Mental Health Continuum – Short Form (MHC – SF; Keyes, 2005), General Health Questionnaire – 28 (GHQ – 28; Goldberg, 1978) and Raven's Standard Progressive Matrices (SPM; Raven et al, 1992) were prepared for the whole samples - DHH Female Young Adult (DHFYA),

DHH Female Middle Adult (DHFMA), DHH Male Young Adult (DHMYA), DHH Male Middle Adult (DHMMA), Normal Hearing Female Young Adult (NHFYA), Normal Hearing Female Middle Adult (NHFMA), Normal Hearing Male Young Adult (NHMYA) and Normal Hearing Male Middle Adult (NHMMA).

Results Analysis of the present study was done in a phased manner:

1) Checking of missing raw data and outliers,
2) Psychometric adequacy of the Psychological scales – Reliability and Homogeneity,
3) Descriptive statistics (Mean, SD, Kurtosis, Skewness)
4) Relationship between the dependent variables
5) Prediction – ANOVA and Regression.

1) Checking of missing raw data and outlier

The raw data set was checked for missing raw data and extreme outliers. Since there were no missing data or extreme outliers, further analysis was carried on.

2) Psychometric adequacy of the Psychological scales

Psychometric analyses of the scales and subscales were done by employing Microsoft Office Excel 2013 and IBM's Statistical Package for the Social Sciences (SPSS 26). The psychological scales used in the present study were originally constructed for a different culture. Thus, before applying to the present study, it was thought need to check the appropriateness and verify the trustworthiness of the scales for the population under study.

Accordingly, the reliabilities of all the subscales i.e., (i) Somatic Symptoms, (ii) Anxiety/insomnia, (iii) Social Dysfunction, (iv) Severe Depression, (v) Emotional Well-being, (vi) Social Well-being, and (vii) Psychological Well-being in the present study were calculated using Cronbach's Alpha. Table-1 shows the reliability for the four subscales of GHQ-28 i.e., somatic symptoms, anxiety/insomnia, social dysfunction and severe depression subscales; and three subscales of MHC-SF i.e., emotional well-being, social well-being and psychological well-being subscales.

The internal consistency of the scales was calculated using Cronbach's Alpha and all the scales and subscales were found to be highly reliable (Table 1). The Somatic Symptom subscale consists of 7 items (α = .84), the Anxiety/Insomnia subscale consists of 7 items (α = .91), the Social Dysfunction subscale consists of 7 items (α = .89) and the Severe Depression subscale consists of 7 items (α = .82) of the GHQ-28 appeared to have good internal consistency. Cronbach's alphas for the 3 Emotional Wellbeing, 5 Social Wellbeing and 6 Psychological Wellbeing items of the MHC-SF Scale were .87, .83 and .87 respectively. Cronbach's Alpha for the RSPM scale was .73.

Table- 1: *Reliability and Test of Homogeneity of the Scales/subscales for the samples*

Scales/Subscales	Cronbach's alpha	Levene's Test of Equality of Variance	Brown Forsythe
Somatic Symptoms	.84	.91	.00
Anxiety/Insomnia	.91	.47	.00
Social Dysfunction	.89	.06	.00
Severe Depression	.82	.31	.00
Emotional Wellbeing	.87	.83	.00
Social Wellbeing	.83	.07	.00
Psychological Wellbeing	.87	.23	.00
Intelligence	.73	.07	.00

Levene's Test of Equality of variances and Browne Forsythe's tests were employed for checking the homogeneity of variances. Levene's test examined whether the variances of the samples under study are approximately equal. ***Table-1*** shows that the significances of Levene's Test of Equality of variances for each of the subscales or scales under study are greater than .05, which is non-significant. This indicated that the assumptions of homogeneity of variance have been met. Brown-Forsythe Robust tests (for equality of means) are all statistically significant for all the scales and subscales as their p-values are less than 0.05. Thus, further statistical analyses can be continued as the results indicated the appropriateness of the scales/ subscales.

3. Descriptive Statistics (Mean, SD, Kurtosis, Skewness)

To explore the level of mental health variables and intelligence of the comparision groups mentioned in the Hypothesis-1 that *'It was expected that there*

will be a different level of Mental Health and Intelligence among the groups under study, the descriptive statistic was calculated.

The descriptive statistics of the raw data consisting of the Mean, Standard Deviation, Skewness and Kurtosis are indices for normality of the scores of the population under study on the measured variables. *Table-2a – 2i* shows the *Mean, SD, Kurtosis* and *Skewness* of all the subscales and scales - somatic symptoms, anxiety/insomnia, social dysfunction and severe depression subscales of GHQ-28; emotional well-being, social well-being and psychological well-being subscales of MHC-SF; and intelligence understudy for all different group of samples. To test the assumption of normality, skewness and kurtosis were analysed. The results in *Table - 2a – 2i* show that the samples are normally distributed.

Table- 2a shows the *Mean, SD, Kurtosis* and *Skewness* of all the comparison groups on Somatic Symptom variables. The mean score on Somatic symptoms variables (*Table- 2a*) indicated that the mean scores of DHH Female Young adults were highest (*M* = 20.33, *SD* = .99) whereas that of Normal Hearing Female Middle adults was the lowest (*M* = 11.93, *SD* =1.14).

Table- 2a: *Mean, Standard Deviations, Kurtosis and Skewness of the Somatic Symptoms subscales for the samples*

	Somatic Symptoms			
	M	*SD*	Kurtosis	Skewness
DHH Female Young Adult	22.33	.99	-.09	-.07
DHH Female Middle Adult	20.07	1.08	6.54	-2.25
DHH Male Young Adult	18.83	1.05	8.35	2.25
DHH Male Middle Adult	17.57	.97	.46	-.68
NH Female Young Adult	16.50	.97	1.37	-1.20
NH Female Middle Adult	15.80	1.06	.68	-.49
NH Male Young Adult	14.33	.80	-.65	-.27
NH Male Middle Adult	11.93	1.14	-.67	-.16

Table- 2b shows the *Mean, SD, Kurtosis* and *Skewness* of all the comparison groups on Anxiety/insomnia variables. The mean score on Anxiety/Insomnia variables (Table-2b) also indicated that the mean scores of DHH Female Young adults were highest (*M* = 20.93, *SD* = 2.24) whereas that of Normal Hearing Female Middle adults was the lowest (*M* = 9.67, *SD* =1.42).

Table- 2b: *Mean, Standard Deviations, Kurtosis and Skewness of the Anxiety/Insomnia subscales for the samples*

	Anxiety/Insomnia			
	M	*SD*	Kurtosis	Skewness
DHH Female Young Adult	20.93	2.24	-1.55	-.28
DHH Female Middle Adult	19.07	1.14	-.93	.01
DHH Male Young Adult	18.30	2.63	-1.11	.20
DHH Male Middle Adult	16.97	1.38	-.17	1.00
NH Female Young Adult	16.03	2.03	2.47	1.90
NH Female Middle Adult	13.70	.70	.06	-.14
NH Male Young Adult	12.17	1.80	2.12	-.15
NH Male Middle Adult	9.67	1.42	.03	-.21

Table- 2c shows the *Mean, SD, Kurtosis* and *Skewness* of all the comparison groups on Social Dysfunction variables. It was also seen in Table 2c that the mean score of DHH Female Young adult (*M* = 26.13, *SD* = 1.72) on Social Dysfunction variables was highest among the group while that of Normal Hearing Male Middle Adult (*M* = 16.47, *SD* = 2.10) was lowest.

Table- 2c: *Mean, Standard Deviations, Kurtosis and Skewness of the Social Dysfunction subscales for the samples*

	Social Dysfunction			
	M	*SD*	Kurtosis	Skewness
DHH Female Young Adult	26.13	1.72	2.17	-1.40
DHH Female Middle Adult	22.97	2.11	1.43	-1.18
DHH Male Young Adult	21.30	2.78	.88	-.55
DHH Male Middle Adult	18.73	3.03	-.77	.18
NH Female Young Adult	21.23	2.45	-.47	-.38
NH Female Middle Adult	19.30	2.05	1.71	-1.00
NH Male Young Adult	18.27	2.26	-.91	.09
NH Male Middle Adult	16.47	2.10	-1.11	-.17

Table- 2d shows the *Mean, SD, Kurtosis* and *Skewness* of all the comparison groups on Severe Depression variables. Similarly, on Severe Depression variables, the mean score of DHH Female Young Adult was highest (*M* = 19.00, *SD* = 2.05) whereas that of Normal Hearing Male Middle Adult was lowest (*M* = 12.43, *SD* = 3.58).

Table- 2d: *Mean, Standard Deviations, Kurtosis and Skewness of the Severe Depression subscales for the samples*

	Severe Depression			
	M	*SD*	Kurtosis	Skewness
DHH Female Young Adult	19.00	2.05	1.38	-1.28
DHH Female Middle Adult	17.83	2.82	-.55	-.27
DHH Male Young Adult	16.93	2.27	1.58	1.11
DHH Male Middle Adult	14.57	4.30	-.80	.18
NH Female Young Adult	14.10	2.84	1.96	1.12
NH Female Middle Adult	13.13	3.37	.10	.88
NH Male Young Adult	12.97	2.31	-.29	-.19
NH Male Middle Adult	12.43	3.58	-1.40	-.16

Table- 2e shows the *Mean, SD, Kurtosis* and *Skewness* of all the comparison groups on Emotional Well-being variables. Compared to the previous variables, the mean score reversed in the case of Emotional Wellbeing variables as shown in Table 2e where Normal Hearing Male Middle Adult's mean score was highest (M = 15.47, SD = 2.24) and the lowest score was that of DHH Female Young Adult (M = 8.27, SD = 3.00).

Table -2e: *Mean, Standard Deviations, Kurtosis and Skewness of the Emotional Wellbeing subscales for the samples*

	Emotional Wellbeing			
	M	*SD*	Kurtosis	Skewness
DHH Female Young Adult	8.57	3.00	.51	1.30
DHH Female Middle Adult	9.70	1.76	-.37	.53
DHH Male Young Adult	10.27	1.64	.24	-.26
DHH Male Middle Adult	12.07	2.45	-.11	.33
NH Female Young Adult	12.20	2.20	.32	.04
NH Female Middle Adult	13.40	1.87	-.06	.56
NH Male Young Adult	13.97	2.09	-1.11	.17
NH Male Middle Adult	15.47	2.24	-.63	-.89

Table- 2f showed the mean score on Social Wellbeing variables where the highest mean score was that of Normal Hearing Male Young Adult (M = 22.93, SD = 3.36) and lowest was that of DHH Female Young Adult (M = 15.77, SD = 3.15).

Table- 2f: *Mean, Standard Deviations, Kurtosis and Skewness of the Social Wellbeing subscales for the samples*

	Social Wellbeing			
	M	*SD*	Kurtosis	Skewness
DHH Female Young Adult	15.77	3.15	1.30	1.25
DHH Female Middle Adult	19.47	3.79	-.01	.78
DHH Male Young Adult	21.70	4.79	-.46	-.03
DHH Male Middle Adult	21.23	4.13	-.71	.51
NH Female Young Adult	21.80	3.52	-.72	.37
NH Female Middle Adult	23.80	2.88	.03	-.71
NH Male Young Adult	22.93	3.36	-.30	.03
NH Male Middle Adult	22.33	2.94	.09	.57

Table- 2g shows the *Mean, SD, Kurtosis* and *Skewness* of all the comparison groups on Psychological variables. Normal Hearing Male Middle Adult has the highest mean score of 31.90 (*SD* = 2.22) on Psychological Wellbeing variables whereas DHH Female Young Adult (*M* = 20.37, *SD* = 2.47) scored the lowest (Table- 2g).

Table- 2g: *Mean, Standard Deviations, Kurtosis and Skewness of the Psychological Wellbeing subscales for the samples*

	Psychological Wellbeing			
	M	*SD*	Kurtosis	Skewness
DHH Female Young Adult	20.37	2.47	-1.50	.12
DHH Female Middle Adult	22.30	1.58	-1.28	-.20
DHH Male Young Adult	26.23	1.76	1.09	-.91
DHH Male Middle Adult	26.57	1.28	-.91	-.27
NH Female Young Adult	27.33	2.04	1.50	.82
NH Female Middle Adult	28.87	2.81	1.75	1.16
NH Male Young Adult	30.97	2.50	12.85	-2.90
NH Male Middle Adult	31.90	2.22	-.99	.05

Table- 2h shows the *Mean, SD, Kurtosis* and *Skewness* of all the comparison groups on intelligence variables. The mean score on Intelligence showed that Normal Hearing Male Middle Adult (*M* = 44.37, *SD* = 5.01) has the highest score whereas DHH Female Young Adult (*M*= 16.90, *SD* = 2.55) scored the lowest as shown in Table- 2h.

Table-2h: *Mean, Standard Deviations, Kurtosis and Skewness of the Intelligence subscales for the samples*

	Intelligence			
	M	*SD*	Kurtosis	Skewness
DHH Female Young Adult	16.90	2.55	1.43	.92
DHH Female Middle Adult	23.90	3.33	4.76	1.64
DHH Male Young Adult	25.27	3.25	1.06	.24
DHH Male Middle Adult	30.63	3.83	1.29	-1.01
NH Female Young Adult	31.50	2.66	-.57	.14
NH Female Middle Adult	34.90	3.39	-.04	-.70
NH Male Young Adult	42.37	5.54	-.10	.19
NH Male Middle Adult	44.37	5.01	1.96	-1.00

Considering the whole sample (as shown in Table- 2i), the mean scores on the dependent variables were 17.17 (SD = 3.24) for Somatic Symptoms variables, 15.85 (SD = 3.95) for Anxiety/Insomnia variables, 20.55 (SD = 3.67) for Social Dysfunction variables, 15.12 (SD = 3.78) for Severe Depression, 11.95 (SD = 3.07) for Emotional Wellbeing variables, 21.13 (SD = 4.27) for Social Wellbeing variables, 26.82 (SD = 4.27) for Psychological Wellbeing variables and 31.23 (SD = 9.50) for Intelligence variables.

Table- 2i: *Mean, Standard Deviations, Kurtosis and Skewness of the dependent variables for the whole samples*

Dependent Variables	*M*	*SD*	Kurtosis	Skewness
Somatic Symptoms	17.17	3.24	-.56	-.02
Anxiety/Insomnia	15.85	3.95	-.61	-.07
Social Dysfunction	20.55	3.67	-.70	.06
Severe Depression	15.12	3.78	-.68	-.04
Emotional Wellbeing	11.95	3.07	-.72	.03
Social Wellbeing	21.13	4.27	-.68	-.03
Psychological Wellbeing	26.82	4.27	-.35	-.19
Intelligence	31.23	9.50	-.61	.21

Table- 3: *Comparison of Mean scores of the samples on dependent variables*

Independent Variables		Somatic Symptoms	Anxiety/ Insomnia	Social Dysfunction	Severe Depression	Emotional Wellbeing	Social Wellbeing	Psychological Wellbeing	Intelligence
Hearing Abilities	DHHs	19.70	18.82	22.28	17.08	10.15	19.54	23.87	24.18
	Normal Hearing	14.64	12.89	18.82	13.16	13.76	22.72	29.77	38.28
Gender	Female	18.68	17.43	22.41	16.02	10.97	20.21	24.72	26.80
	Male	15.67	14.28	18.69	14.23	12.94	22.05	28.92	35.66
Age	Young Adult	17.80	16.79	21.44	15.21	11.47	20.40	26.26	29.86
	Mid Adult	16.60	15.01	19.75	15.04	12.39	21.79	27.32	32.47

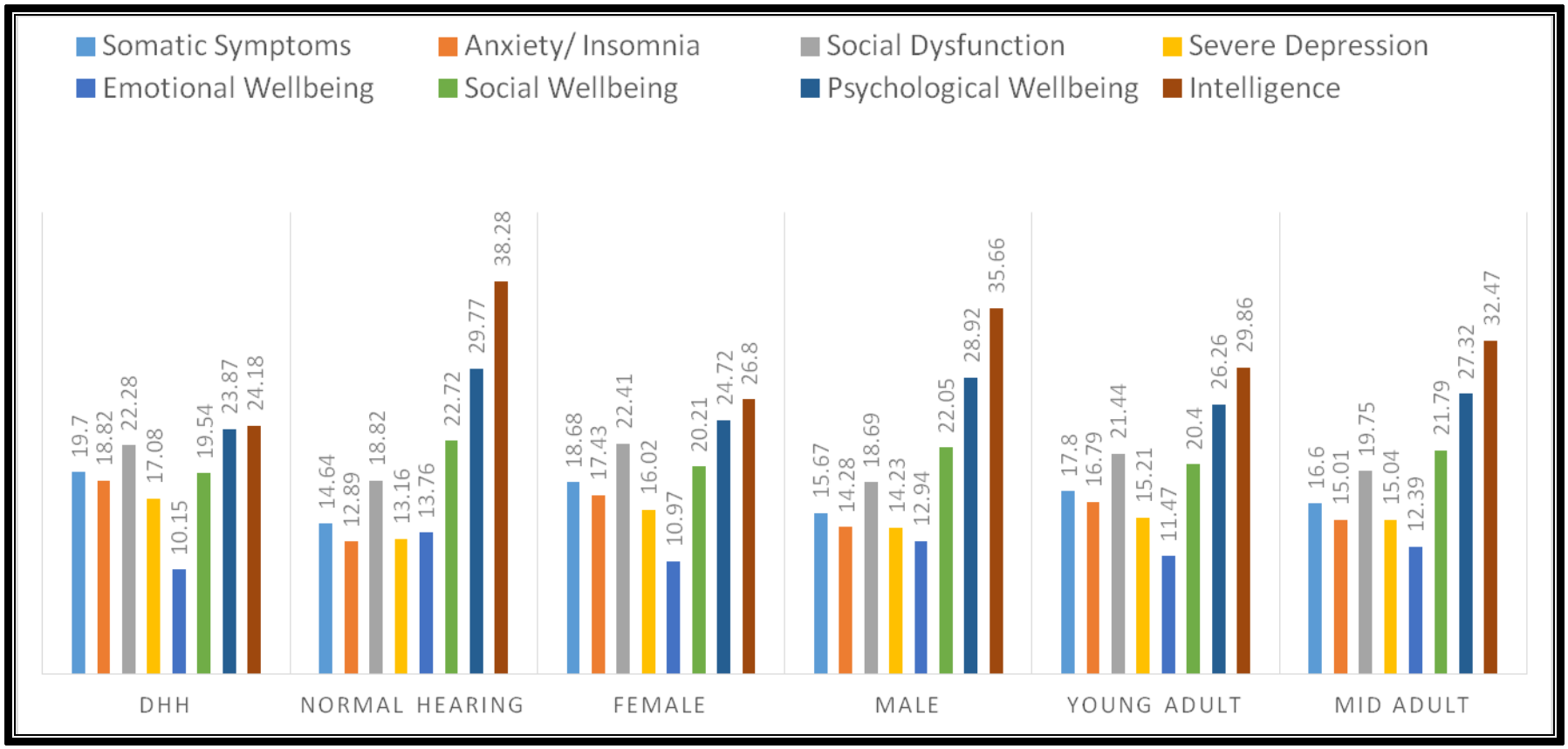

Figure- 6. *Graphical representation of Comparison of Mean scores of the samples on dependent variables.*

Table- 3 gives the comparison of mean scores of groups of samples on each dependent variable. Individuals with hearing impairment scored higher than the Normal Hearing individuals on Somatic Symptoms, Anxiety / Insomnia, Social Dysfunction and Severe Depression variables whereas scores of Normal Hearing Individuals were higher than the DHH on Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence variables. Gender-wise, the scores of Females were higher on Somatic Symptoms, Anxiety / Insomnia, Social Dysfunction and Severe Depression while males scored higher on Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence variables. In terms of Age group, the Young Adult scored higher than the Middle Adult on Somatic Symptoms, Anxiety / Insomnia, Social Dysfunction and Severe Depression while Middle Adult scored higher on Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence variables.

Results suggested that DHH individuals seem to have a higher level of mental health problems than normal hearing individuals. The scores on anxiety, depression, social dysfunction and somatic symptoms were higher for individuals with hearing loss. These results corresponded to the findings of the previous researcher that the prevalence of mental health problems was higher in individuals with hearing loss (Abbas et al., 2019; Istad et al., 2019; Clarke et al., 2019). Clarke and his colleagues (2019) suggested that hearing loss leads to anxiety that impacted sleeping habits, stress, social isolation and depression. Several types of research linked hearing loss with the prevalence of anxiety and elevated risk of depression (Abbas et al. 2019; Eleuteri et al., 2010; Knutson, Johnson, & Murray, 2006; Kobosko et al., 2018). Previous studies had also linked social isolation with hearing loss which led to poor mental health (Baldridge & Kulkarni, 2017; Dawes et al., 2015; Heffernan et al., 2019; Stevenson et al., 2017). Knutson and friends (2006) found increased levels of social introversion and loneliness in DHH individuals.

The present study had also shown that the emotional, social and psychological wellbeing of the DHH individuals were lower when compared to hearing individuals. These findings are commensurate with the previous research findings on the correlation between emotional, social and psychological wellbeing with hearing impairment (Lucas, Katiri & Kitterick, 2017). Hearing loss not only affected the relationship and social exclusion but also lowered self-esteem, which

consequently affected mental health and wellbeing (Fellinger et al., 2009; Ridgeway, 1997). The results of the present study also suggested that normal-hearing individuals performed better in an intelligence test when compared with DHH individuals. This finding was in congruence with the findings of the previous intelligence research which found lower intelligence performances of the DHH individuals (Huber & Kipman, 2012; Myklebust, 1960; Pronovost et al., 1976).

These findings confirmed the first, second and third hypotheses of the present study that the level of mental well-being being (Emotional Well-being, Social Well-being, Psychological Well-being) among DHH individuals would be significantly lower, whereas mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression) among DHH individuals would be significantly higher when compared to normal hearing and that normal-hearing individuals would perform significantly higher than DHH individuals on cognitive abilities (Intelligence).

It was found in the present study that females had higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression when compared to males and vice-versa on emotional, social and psychological wellbeing and intelligence. Previous studies suggested that women suffered more mental health such as anxiety and depression than their male counterparts (Copeland et al., 1999; Sonnenberg, Beekman, Deeg, & van Tilburg, 2000; Zunzunegui, Alvarado, Béland, & Vissandjee, 2009). Sonnenberg and colleagues (2000) had shown that the prevalence of depression was doubled in women when compared to men in the adult population. This confirmed the fourth hypothesis set forth for the study that mental well-being (Emotional Well-being, Social Well-being, Psychological Well-being) would be significantly higher for males than females and vice versa for mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression); males will perform significantly higher on cognitive abilities (Intelligence) than females.

The results of the present study revealed that young adults had higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults and vice-versa on emotional, social and psychological wellbeing and intelligence. This proves the fifth hypothesis that Young adults will have

significantly higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults but significantly lower levels of emotional, social and psychological wellbeing and intelligence. However, the finding of the present study is in contrast with the previous findings of McCrone and colleagues (2008) which reported that older people were more prone to suffer from depression, social dysfunction and declining physical health. Older adults were found to be more likely to experience insomnia (Jean-Louis, et al., 2001; Klink, et al., 1992; Ohayon, 1996).

4) Relationship between the dependent variables.

Analysis of data was done to examine the relationship between dependent variables as mentioned in Hypothesis - 6 that '*A significant relationship between dependent variables was anticipated*', and the correlation between the dependent variables was calculated.

Bivariate correlation (Pearson Correlation) was employed to determine the significant relationship between the dependent variables. Results of the Pearson correlation in Table- 4 revealed significant correlations among the dependent variables.

Somatic Symptoms had a significant positive relationship with Anxiety / Insomnia (r = .82, p < .01), Social Dysfunction (r = .69, p < .01), Severe Depression (r = .56, p < .01) and a significant negative relationship with Emotional Wellbeing (r = -.66, p < .01), Social Wellbeing (r = -.40, p < .01), Psychological Wellbeing (r = -.79, p < .01) and Intelligence (r = -.86, p < .01).

Anxiety / Insomnia had a significant positive correlation with Social Dysfunction (r = .624, p < .01), Severe Depression (r = .512, p < .01) and a significant negative correlation with Emotional Wellbeing (r = -.64, p < .01), Social Wellbeing (r = -.39, p < .01), Psychological Wellbeing (r = -.77, p < .01) and Intelligence (r = -.81, p < .01).

Social Dysfunction had a significant positive correlation with Severe Depression (r = .41, p < .01) and significant negative relationship with Emotional Wellbeing (r = -.51, p < .01), Social Wellbeing (r = -.34, p < .01), Psychological Wellbeing (r = -.62, p < .01) and Intelligence (r = -.657, p < .01).

Significant negative correlations were found between Severe Depression and Emotional Wellbeing (r = -.498, p < .01), Social Wellbeing (r = -.291, p < .01), Psychological Wellbeing (r = -.54, p < .01) and Intelligence (r = -.53, p < .01).

There was a significant positive relationship between Emotional Wellbeing and Social Wellbeing (r = .36, p < .01), Psychological Wellbeing (r = .63, p < .01) and Intelligence (r = .65, p < .01).

Significant positive correlation was also found between Social Wellbeing and Psychological Wellbeing (r = .42, p < .01) and with Intelligence (r = .41, p < .01). There was a significant positive relation between Psychological Wellbeing and Intelligence (r = .79, p < .01).

Highest significant positive correlation was found between Somatic Symptoms and Anxiety / Insomnia (r = .82, p < .01) whereas the highest significant negative correlation was found between Somatic Symptoms and Intelligence (r = -.86, p < .01).

The above findings proved hypothesis no. 6 of the study, that there are significant relationships between the dependent variables under study. Literature suggested that the relationship between mental health and social factors is bidirectional, and vice versa (Bährer-Kohler, 2012). Previous studies attributed depression to chronic health problems, decreased physical activities, social isolation and decreased family interactions (Grundy et al., 2013). A study by Grundy and colleagues (2013) linked social isolation in the elderly to poor mental health such as depression, suicidal ideation, and even death. Cognitive and physical impairments, social isolation, depression and stress are contributing factors to anxiety (Vink et al., 2008). Depression in older people impacted physical wellbeing and quality of life (Fiske et al., 2009). Chu and colleagues (2016) correlated insomnia with loneliness.

Table- 4: *Showing the significant relationship (Pearson Correlation) between dependent variables for the samples*

	Somatic Symptoms	Anxiety/ Insomnia	Social Dysfunction	Severe Depression	Emotional Wellbeing	Social Wellbeing	Psychological Wellbeing	Intelligence
Somatic Symptoms	1	.82**	.69**	.56**	-.66**	-.40**	-.79**	-.86**
Anxiety/Insomnia		1	.624**	.512**	-.64**	-.39**	-.77**	-.81**
Social Dysfunction			1	.41**	-.51**	-.34**	-.62**	-.657**
Severe Depression				1	-.498**	-.291**	-.54**	-.53**
Emotional Wellbeing					1	.36**	.63**	.65**
Social Wellbeing						1	.42**	.41**
Psychological Wellbeing							1	.79**
Intelligence								1

** *Correlation is significant at the 0.01 level (2-tailed).*

Table- 5 : *Showing the significant correlation (Spearman) between demographic and dependent variables for the samples*

	Hearing Abilities	Gender	Age	Somatic Symptoms	Anxiety/ Insomnia	Social Dysfunction	Severe Depression	Emotional Wellbeing	Social Wellbeing	Psychological Wellbeing
Hearing Abilities	1.00	0.00	-0.05	-.82**	-.79**	-.47**	-.53**	.59**	.37**	.72**
Gender		1.00	0.05	-.42**	-.36**	-.50**	-.22**	.29**	.19**	.49**
Age			1.00	-0.12	-.19**	-.20**	-0.01	0.12	.15*	0.08

**Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

Spearman correlation was calculated to examine the relationship of demographics such as Hearing Abilities, Gender and Age Group with dependent variables. The result as shown in Table 5 indicated that there were several significant relationships among them.

Hearing Abilities had a significant negative correlation with Somatic Symptoms (r = -.82, p < .01), Anxiety / Insomnia (r = -.79, p < .01), Social Dysfunction (r = -.47, p < .01) and Severe Depression (r = -.53, p < .01) and a significant positive relationship with Emotional Wellbeing (r = .59, p < .01), Social Wellbeing (r = .37, p < .01), Psychological Wellbeing (r = .72, p < .01).

Gender had a significant negative correlation with Somatic Symptoms (r = -.42, p < .01), Anxiety / Insomnia (r = -.36, p < .01), Social Dysfunction (r = -.50, p < .01) and Severe Depression (r = -.22, p < .01) and a significant positive relationship with Emotional Wellbeing (r = .29, p < .01), Social Wellbeing (r = .19, p < .01), Psychological Wellbeing (r = .49, p < .01).

Age had a significant negative correlation with Anxiety / Insomnia (r = -.19, p < .01) and Social Dysfunction (r = -.20, p < .01) and a significant positive relationship with Social Wellbeing (r = -.36, p < .05).

The highest significant positive correlation was found between Hearing Abilities and Psychological Wellbeing (r = .72, p < .01) whereas the highest significant negative correlation was found between Hearing Impairment and Somatic Symptoms (r = -.82, p < .01).

Literature addressed the prevalence of anxiety and depression in DHH individuals (Abbas et al., 2019; Eleuteri et al., 2010; Knutson et al., 2006; Kobosko et al., 2018). Hearing abilities and psychosocial wellbeing were found to be correlated and are influenced by variables such as age, ethnicity and other social factors (Chen, 1994; Ives, Bonino, et al., 1995; Nachtegaal et al., 2009; Pronk et al., 2011). Hawthorne (2008) found young adults were more socially alienated than middle adults. Hearing loss was considerably linked to decreased social functioning by Eleuteri and colleagues (2010) in the adult population. DHH individuals were found to be more vulnerable to physical symptoms associated with anxiety and insomnia (Clarke, Hoare, & Killan, 2019).

(5) Prediction of Independent on Dependent Variables

The ANOVA and Kruskal - Wallis H Test were calculated to examine any significant and interaction independent variables on dependent variables as mentioned in ***Hypothesis - 7:*** 'Hearing Ability, 'Gender' and 'Age group' would have a significant independent effect on Emotional Well-being, Social Well-being, Psychological Well-being, Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction. Severe Depression and Intelligence; and ***Hypothesis - 8:*** 'Hearing Ability, 'Gender' and 'Age group' would have a significant interaction effect on Emotional Well-being, Social Well-being, Psychological Well-being, Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, Severe Depression and Intelligence.

Analysis of variance indicated the significant independent effects of the independent variables of 'Hearing Abilities', 'Gender' and 'Age Group' on the dependent variables and also the significant interaction effect of 'Hearing Abilities x Gender x Age Group' on the dependent variables for the whole sample.

2x2x2 Factorial ANOVA was employed to depict the independent effects, and interaction effects of Hearing Impairment, Gender, and Age group on the dependent variables. Results of the ANOVA are presented in table 6a – 6b.

The result in Table 6a showed the independent and interaction effects of Hearing Abilities, Gender and Age group on the subscales of GHQ-28 i.e., Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression subscales. Hearing Abilities have a significant independent effect with an effect size of 61% on Somatic symptoms, 57 % on Anxiety/Insomnia, 22% on Social Dysfunction and 27% on Severe Depression variables. Gender has a significant independent effect with an effect size of 22% on Somatic symptoms, 16% on Anxiety/Insomnia, 26% on Social Dysfunction and 6% on Severe Depression variables. Age has a significant independent effect with an effect size of only 2% on Somatic symptoms, 5% on anxiety/insomnia and 1% on Social Dysfunction variables.

Significant interaction effects of Hearing Abilities, Gender and Age on the dependent variables were also found. Hearing Abilities and Gender has a significant interaction effect with an effect size of 83%, 74%, 49% and 34% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression respectively. Hearing Abilities and Age has a significant interaction effect with an effect size of 68%, 63%, 33% and 30% on Somatic symptoms, Anxiety/Insomnia,

Social Dysfunction and Severe Depression variables respectively. Gender and Age have a significant interaction effect with an effect size of 78%, 23%, 36% and 9% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression variables respectively. Hearing Abilities, Gender and Age has a significant interaction effect with an effect size of 90%, 81%, 60% and 38% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression respectively.

Table- 6a: *Independent and interaction effect of 'Hearing Abilities', 'Gender' and 'Age' on the subscales of the GHQ-28 scale for the samples*

Dependent Variables	Independent Variables	Sum of Squares	*df*	Mean Square	*F*	Sig.	Eta
Somatic Symptoms	Hearing Abilities	1535.20	1.00	1535.20	374.06	0.00	.61
	Gender	543.00	1.00	543.00	65.64	0.00	.22
	Age	85.48	1.00	85.48	8.38	0.00	.02
	Hearing x Gender	2078.21	3.00	692.74	376.88	0.00	.83
	Hearing x Age	1700.91	3.00	566.97	164.97	0.00	.68
	Gender x Age	709.85	3.00	236.62	30.99	0.00	.78
	Hearing x Gender x Age	2273.10	7	324.73	315.35	0.00	.90
Anxiety/Insomnia	Hearing Abilities	2106.34	1.00	2106.34	310.30	0.00	.57
	Gender	598.50	1.00	598.50	45.61	0.00	.16
	Age	189.96	1.00	189.96	12.80	0.00	.05
	Hearing x Gender	2742.45	3.00	914.15	220.27	0.00	.74
	Hearing x Age	2358.35	3.00	786.12	136.06	0.00	.63
	Gender x Age	841.01	3.00	280.34	22.97	0.00	.23
	Hearing x Gender x Age	2996.80	7	428.11	136.98	0.00	.81
Social Dysfunction	Hearing Abilities	721.07	1.00	721.07	68.69	0.00	.22
	Gender	828.82	1.00	828.82	82.51	0.00	.26
	Age	171.46	1.00	171.46	13.39	0.00	.01
	Hearing x Gender	1589.90	3.00	529.97	76.75	0.00	.49
	Hearing x Age	1072.13	3.00	357.38	39.28	0.00	.33
	Gender x Age	1166.90	3.00	388.97	44.72	0.00	.36
	Hearing x Gender x Age	1943.80	7	277.69	50.50	0.00	.60
Severe Depression	Hearing Abilities	924.34	1.00	924.34	88.31	0.00	.27
	Gender	192.60	1.00	192.60	14.22	0.00	.06
	Age	1.75	1.00	1.75	0.12	0.73	.02
	Hearing x Gender	1162.88	3.00	387.63	40.61	0.00	.34
	Hearing x Age	1034.85	3.00	344.95	34.20	0.00	.30
	Gender x Age	289.81	3.00	96.60	7.29	0.00	.09
	Hearing x Gender x Age	1285.60	7	183.66	20.00	0.00	.38

Table- 6b: *Independent and interaction effect of 'Hearing Abilities', 'Gender' and 'Age' on the subscales of the MHC-14 scale for the samples*

Dependent Variables	Independent Variables	Sum of Squares	*df*	Mean Square	*F*	Sig.	Eta
Emotional Wellbeing	Hearing Abilities	781.20	1.00	781.20	126.03	0.00	.27
	Gender	234.04	1.00	234.04	27.54	0.00	.10
	Age	50.13	1.00	50.13	5.41	0.02	.03
	Hearing x Gender	1015.45	3.00	338.48	64.37	0.00	.45
	Hearing x Age	900.41	3.00	300.14	52.23	0.00	.40
	Gender x Age	356.55	3.00	118.85	14.76	0.00	.16
	Hearing x Gender x Age	1138.66	7	162.67	33.76	0.00	.50
Social Wellbeing	Hearing Abilities	604.84	1.00	604.84	38.28	0.00	.14
	Gender	203.50	1.00	203.50	11.64	0.00	.05
	Age	114.34	1.00	114.34	6.40	0.01	.02
	Hearing x Gender	1050.35	3.00	350.12	24.93	0.00	.24
	Hearing x Age	697.95	3.00	232.65	14.97	0.00	.16
	Gender x Age	455.71	3.00	151.90	9.17	0.00	.10
	Hearing x Gender x Age	1324.36	7	189.19	14.44	0.00	.30
Psychological Wellbeing	Hearing Abilities	2088.60	1.00	2088.60	219.05	0.00	.48
	Gender	1058.40	1.00	1058.40	76.34	0.00	.24
	Age	66.53	1.00	66.53	3.69	0.06	.02
	Hearing x Gender	3192.07	3.00	1064.02	215.38	0.00	.73
	Hearing x Age	2172.77	3.00	724.26	78.22	0.00	.50
	Gender x Age	1160.57	3.00	386.86	28.55	0.00	.27
	Hearing x Gender x Age	1324.36	7	189.19	14.44	0.00	.76

The result in Table-6b showed the independent and interaction effects of Hearing Abilities, Gender and Age group on the subscales of MHC-14, i.e., Emotional Wellbeing, Social Wellbeing and Psychological Wellbeing subscales. Hearing Abilities, Gender and Age have significant independent and interaction effects on Emotional Wellbeing, Social Wellbeing and Psychological Wellbeing. Hearing Abilities had a significant independent effect with an effect size of 27% on Emotional Wellbeing, 14% on Social Wellbeing and 48% on Psychological Wellbeing. Gender has a significant independent effect with an effect size of 10% on

Emotional Wellbeing, 5% on Social Wellbeing and 24% on Psychological Wellbeing. Age has a significant independent effect with an effect size of 3% on Emotional Wellbeing, 2% on Social Wellbeing and 2% on Psychological Wellbeing.

Hearing Abilities and Gender has a significant interaction effect with an effect size of 45% on Emotional Wellbeing, 24% on Social Wellbeing and 73% on Psychological Wellbeing. Significant interaction effect of Hearing Abilities and Age was found with an effect size of 40% on Emotional Wellbeing, 16% on Social Wellbeing and 50% on Psychological Wellbeing. A significant interaction effect between Gender and Age was found with an effect size of 16% on Emotional Wellbeing, 10% on Social Wellbeing and 27% on Psychological wellbeing. A significant interaction effect between Hearing Abilities, Gender and Age were found with an effect size of 50% on Emotional Wellbeing, 30% on Social Wellbeing and 76% on Psychological Wellbeing.

The results of the ANOVA in Table-6a and 6b proved the seventh and eighth hypotheses set forth for the present study. Hearing ability and Gender had a significant interaction effect on the dependent variables. Hearing abilities and Age Group also had a significant interaction effect on the dependent variables. These findings were in congruence with previous research findings. Tambs (2004) associated hearing abilities with mental health effects, such as anxiety, depression and well-being in adults and found that the mental health factors of young and middle-aged DHH were more positively correlated with hearing loss than among older DHH adults. The probability of DHH individuals showing signs of anxiety and depression was higher than normal hearing individuals (Shoham, et al., 2019). Hearing impairment was found to impact psychological, emotional and social well-being and affected social interaction (Lucas, Katiri and Kitterick, 2017). Poor communication was correlated to poor psychosocial functioning (Black and Glickman 2005). Women were found to suffer more mental health problems such as depression and anxiety when compared to men (Copeland et al., 1999; Sonnenberg et al., 2000; Zunzunegui et al., 2009).

Post Hoc Analysis (Scheffe's test) between the Groups on Mental Health Variables

The Post-hoc multiple mean comparisons employing Scheffe's test were conducted between DHH Female Young Adult (DHFYA), DHH Female Middle Adult (DHFMA), DHH Male Young Adult (DHMYA), DHH Male Middle Adult (DHMMA), Normal Hearing Female Young Adult (NHFYA), Normal Hearing Female Middle Adult (NHFMA), Normal Hearing Male Young Adult (NHMYA) and Normal Hearing Male Middle Adult (NHMMA) on the dependent variables, which revealed significant mean differences between most of the groups as seen in Table 7a-7g. The highest significant mean difference was found between DHHMYA and DHHMMA (12.27) on Somatic symptoms variables. On the Anxiety/ insomnia, Social Dysfunction, Severe Depression and Emotional Wellbeing variables, the highest significant mean difference was found between DHHFYA and DHHMMA. The highest significant means difference was found between DHHFYA and NHFMA (-8.03) on Social Wellbeing. On Psychological Wellbeing variables, the highest significance means difference was between DHHFYA and NHMMA (-11.53).

Table- 7a: *Showing significant mean difference (Scheffe) between the groups on Somatic symptoms variables for the samples*

Somatic Symptoms	DHHFMA	DHHMYA	DHHMMA	NHFYA	NHFMA	NHMYA	NHMMA
DHHFYA	2.26*	3.50*	4.77*	5.83*	6.53*	8.00*	10.40*
DHHFMA		1.23*	2.50*	3.57*	4.27*	5.73*	8.13*
DHHMYA			12.27*	2.33*	3.04*	4.50*	6.90*
DHHMMA				1.67*	1.77*	3.23*	5.63*
NHFYA					.70	2.16*	-4.57*
NHFMA						1.47*	3.87*
NHMYA							2.40*

Table- 7b: *Showing significant mean difference (Scheffe) between the groups on Anxiety/insomnia variables for the samples*

Anxiety/ Insomnia	DHHFMA	DHHMYA	DHHMMA	NHFYA	NHFMA	NHMYA	NHMMA
DHHFYA	1.87*	2.63*	3.97*	4.96*	7.23*	8.77*	11.27*
DHHFMA		.07	2.10*	3.03*	5.37*	6.90*	9.40*
DHHMYA			1.33	2.67*	4.60*	6.13*	8.13*
DHHMMA				6.93*	3.27*	4.89*	7.30*
NHFYA					2.33*	3.82*	6.37*
NHFMA						2.33*	1.53*
NHMYA							2.56*

Table- 7c: *Showing significant mean difference (Scheffe) between the groups on Social Dysfunction variables for the samples*

Social Dysfunction	DHHFMA	DHHMYA	DHHMMA	NHFYA	NHFMA	NHMYA	NHMMA
DHHFYA	3.17*	4.33*	7.46*	4.90*	6.83*	7.87*	9.67*
DHHFMA		1.67*	4.23*	1.73	3.67*	4.76*	6.50*
DHHMYA			2.57*	.67	2.00	3.63*	4.83*
DHHMMA				-2.56*	0.56	0.47	2.27
NHFYA					1.93	2.97*	4.77*
NHFMA						1.63	2.83
NHMYA							-7.87*

Table -7d: *Showing significant mean difference (Scheffe) between the groups on Severe Depression variables for the samples*

Severe Depression	DHHFMA	DHHMYA	DHHMMA	NHFYA	NHFMA	NHMYA	NHMMA
DHHFYA	1.27	2.06	4.43*	4.90*	5.87*	6.03*	6.56*
DHHFMA		.90	3.27*	3.73*	4.70*	4.86*	5.40*
DHHMYA			2.37	2.83	3.80*	3.97*	4.50*
DHHMMA				.46	1.43	1.60	2.13
NHFYA					6.97	1.13	1.67
NHFMA						.17	.70
NHMYA							-1.80

Table- 7e: *Showing significant mean difference (Scheffe) between the groups on Emotional Wellbeing variables for the samples*

Emotional Wellbeing	DHHFMA	DHHMYA	DHHMMA	NHFYA	NHFMA	NHMYA	NHMMA
DHHFYA	-1.13	-1.70	-3.50*	-3.63*	-4.83*	-5.40*	-6.90*
DHHFMA		-.13	-.57	-2.56*	-3.76*	-4.47*	-5.76*
DHHMYA			-1.80	-1.93	-3.13	-3.70	-5.20*
DHHMMA				-.13	-1.33	-1.90	-3.40*
NHFYA					-1.20*	-1.76*	-3.26*
NHFMA						-.57	-2.67
NHMYA							-1.50

Table -7f: *Showing significant mean difference (Scheffe) between the groups on Social Wellbeing variables for the samples*

Social Wellbeing	DHHFMA	DHHMYA	DHHMMA	NHFYA	NHFMA	NHMYA	NHMMA
DHHFYA	-3.70	-5.93*	-5.46*	-6.03*	-8.03*	-7.16*	-6.56*
DHHFMA		-2.23	-1.76	-2.33	-4.33*	-3.46*	-2.86
DHHMYA			.46	-.10	-2.10	-1.23	-0.63
DHHMMA				-.57	-1.56	-1.70	-1.10
NHFYA					2.00	-1.13	-.53
NHFMA						.86	1.56
NHMYA							.60

Table -7g: *Showing significant mean difference (Scheffe) between the groups on Psychological Wellbeing variables for the samples*

Psychological Wellbeing	DHHFMA	DHHMYA	DHHMMA	NHFYA	NHFMA	NHMYA	NHMMA
DHHFYA	-.93	-5.86*	-6.20*	-6.96*	-8.50*	-10.60*	-11.53*
DHHFMA		-3.93*	-4.26*	-5.03*	-6.56*	-8.67*	-9.60*
DHHMYA			.33	1.10	3.63*	4.73*	5.66*
DHHMMA				-.76	-2.30*	-4.40*	-5.33*
NHFYA					1.53	-3.63*	-4.56*
NHFMA						2.10	3.03*
NHMYA							.93

ANOVA (Kruskal - Wallis H Test; non-parametric statistics) for measures of Intelligence

Since the RSPM scale is a performance test and violated assumptions for parametric tests, a non-parametric test i.e., Kruskal - Wallis H tests was employed to evaluate the differences between the different comparison groups on the intelligence variables. Results of the independent samples Kruskal - Wallis H test are presented in Table – 8.

A Kruskal-Wallis H test (table – 8) showed that there was a statistically significant difference in the level of intelligence between DHH and normal hearing individuals, $\chi^2(1) = 142.285$, $p = .000$, with a mean rank score of 67.07 for DHH individuals and 173.93 for Normal Hearing individuals. The result also revealed a statistically significant difference in the level of intelligence between females and males, $\chi^2(1) = 45.433$, $p = .000$, with a mean rank score of 90.31 for females and 150.69 for males. The result of the Kruskal Wallis H test between Young adults and Middle Adults in the level of intelligence revealed statistically insignificant differences, $\chi^2(1) = 3.422$, $p = .064$, with a mean rank score of 111.79 for Young Adults and 128.38 for Middle Adults.

Statistically significant differences, $\chi^2(3) = 187.908$, $p = .000$ were found in the level of intelligence across the mean rank scores of 38.83 for DHH females, and 95.31 for DHH males, 141.78 for normal hearing females, and 206.08 for normal hearing males. The result also revealed a statistically significant difference in the level of intelligence among DHH females, DHH Male, NH females and NH Male, $\chi^2(3) = 157.617$, $p = .000$, with a mean rank score of 44.31 for DHH females, 89.83 for DHH males, 141.78 for NH females and 183.78 for NH males. The result of the Kruskal Wallis H test across Gender x Age Group in the level of intelligence revealed statistically insignificant differences, $\chi^2(3) = 58.842$, $p = .000$, with a mean rank score of 72.25 for Female Young Adults, 108.37 for Female Middle Adults, 136.13 for Male Young Adults and 165.25 for Male Middle Adults.

Table- 8: *ANOVA (Non-parametric test using independent Samples Kruskal - Wallis H Test) showing differences in Intelligence*

		N	Mean Rank	χ^2	df	*p*
	Hearing Ability					
Intelligence	DHH	160	67.07	142.285	1	.000
	Normal Hearing	160	173.93			
	Gender					
	Female	160	90.31	45.433	1	.000
	Male	160	150.69			
	Age Group					
	Young Adult	160	111.79	3.422	1	.064
	Middle Adult	160	128.38			
	Hearing Ability x Gender					
	DHH Female	80	38.83	187.908	3	.000
	DHH Male	80	95.31			
	NH Female	80	141.78			
	NH Male	80	206.08			
	Hearing Ability x Age Group					
	DHH Young	80	44.31	157.617	3	.000
	DHH Middle	80	89.83			
	NH Young	80	164.08			
	NH Middle	80	183.78			
	Gender x Age Group					
	Female Young	80	72.25	58.842	3	.000
	Female Middle	80	108.37			
	Male Young	80	136.13			
	Male Middle	80	165.25			
	Hearing Ability x Gender x Age Group					
	DHHFYA	40	17.45	203.881	7	.000
	DHHFMA	40	60.22			
	DHHMYA	40	71.17			
	DHHMMA	40	119.45			
	NHFYA	40	127.05			
	NHFMA	40	156.52			
	NHMYA	40	201.10			
	NHMMA	40	211.05			

The results of the Kruskal-Wallis H Test in Table – 8 showed that there was a statistically significant difference in the level of intelligence across Hearing Ability x Gender x Age Group, $\chi^2(1) = 142.285$, $p = .000$, with a mean rank score of 17.45 for DHHFYA, 60.22 for DHHFMA, 71.17 for DHHMYA, 119.45 for DHHMMA,

127.05 for NHFYA, 156.52 for NHFMA, 201.10 for NHMYA and 211.05 for NHMMA.

A visual representation of the comparison of mean rank scores across Hearing Ability x Gender x Age Group on Intelligence using independent samples Kruskal - Wallis H Test is depicted in Figure. The mean rank score of NHMMA is the highest (211.05) whereas DHHFYA has the lowest mean rank score (17.45).

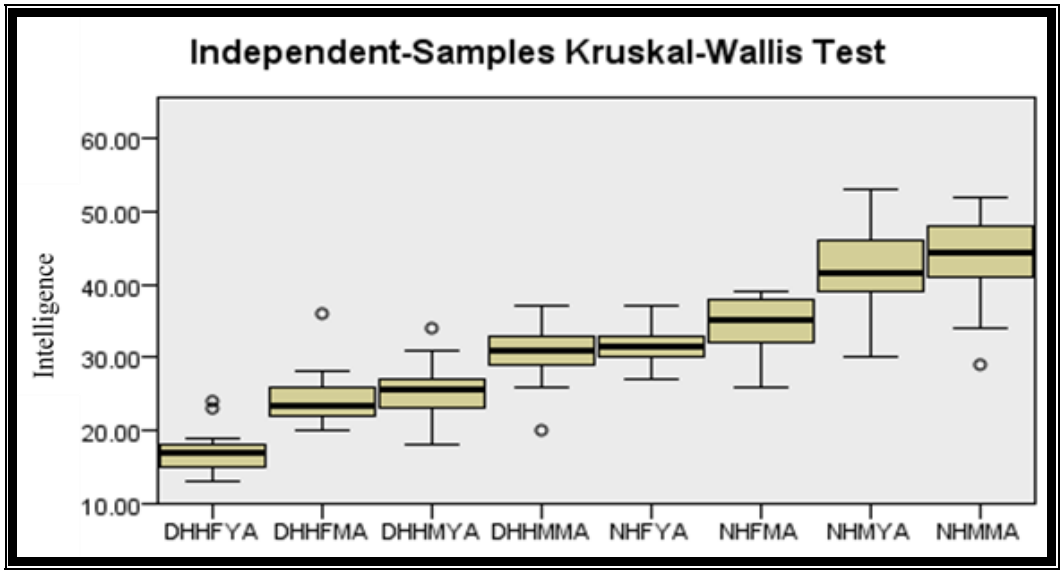

Figure- 7: Independent Samples Kruskal – Wallis H Test across comparison groups on Intelligence.

Post Hoc Mean Comparision (Mann-Whitney U Test) between groups on Intelligence

Pairwise comparison was done using the Mann-Whitney U test to evaluate the differences between the group samples on the level of Intelligence. The result presented in the table – 9 revealed that the level of intelligence for the Normal Hearing individuals is significantly higher than DHH individuals, U = 788.5, p = .000. The Mann-Whitney test revealed that the level of intelligence was greater among males than females, U = 3577, p = .000. There was no significant effect of Age group on the level of intelligence, U = 6189, p = .064.

Table- 9: *Mann-Whitney U Test showing differences in RSPM scales between the comparison groups*

		N	Mean Rank	Sum of Ranks	U	Z	Asymp. Sig. (2-tailed)
Intelligence	Hearing Ability						
	DHH	160	67.07	8048.50	788.500	-11.928	.000
	Normal Hearing	160	173.93	20871.50			
	Gender						
	Female	160	90.31	10837.00	3577.000	-6.740	.000
	Male	160	150.69	18083.00			
	Age Group						
	Young Adult	160	111.79	12744.00	6189.000	-1.850	.064
	Middle Adult	160	128.38	16176.00			

(7) Prediction of Behavioural measures (ANOVA, Post hoc Analysis, Regression Analysis)

Regression Analysis was calculated to evaluate the Intelligence prediction on Mental Health variables to meet objective-7 and hypotheses-9 that '***It was expected that level of Intelligence predicted Mental Health variables'***.

For the prediction of Emotional Wellbeing, Social Wellbeing and Psychological Wellbeing from the behavioural measures of Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression, Multiple regression analyses were employed which attempted to determine the antecedents and the consequences relationship among the behavioural measures of the theoretical construct as envisioned. Results of the multiple regression analyses are presented in Table 10a – 10d.

Table -10a: *Regression Analysis showing the prediction of Somatic Symptoms on Emotional Wellbeing, Social Wellbeing and Psychological Wellbeing.*

Predictor	Criterion	R^2	*F* Change	*df1*	F change Sig	Durbin-Watson	Beta	*t*	sig
Somatic Symptoms	Emotional Wellbeing	0.44	189.93	1/238	0.00	1.04	-0.67	-13.78	0.00
	Social Wellbeing	0.16	45.41	1/238	0.00	1.51	-0.40	-16.73	0.00
	Psychological Wellbeing	.64	420.08	1/238	.00	1.24	-.79	-.20.49	.00
	Emotional Wellbeing + Social Wellbeing + Psychological Wellbeing	0.67	155.05	1/236	0.00	1.30	-0.26	-5.39	0.00
							-0.04	-1.08	0.28
							-0.62	-12.45	0.00

Table- 10b: *Regression Analysis showing the prediction of Anxiety/Insomnia on Emotional Wellbeing, Social Wellbeing and Psychological Wellbeing.*

Predictor	Criterion	R^2	*F* Change	*df1*	F change Sig	Durbin-Watson	Beta	*t*	sig
Anxiety/Insomnia	Emotional Wellbeing	.41	167.51	1/238	0.00	1.01	-.64	.12.94	.00
	Social Wellbeing	.15	43.20	1/238	0.00	.51	-.39	-6.57	.00
	Psychological Wellbeing	.78	319.19	1/238	0.00	1.11	-.77	18.95	.00
	Emotional Wellbeing + Social Wellbeing + Psychological Wellbeing	.64	140.38	3/236	.00	1.14	-0.24	-4.78	0.00
							-0.05	-1.10	0.27
							-0.60	-11.42	0.00

Table 10c: *Regression Analysis showing the prediction of Social Dysfunction on Emotional Wellbeing, Social Wellbeing and Psychological Wellbeing.*

Predictor	Criterion	R^2	*F* Change	*df1*	F change Sig	Durbin-Watson	Beta	*t*	sig
Social Dysfunction	Emotional Wellbeing	.27	86.73	1/238	.00	1.50	-.51	-9.31	.00
	Social Wellbeing	.12	30.92		.00	1.09	-.34	-5.56	.00
	Psychological Wellbeing	39	153.16		.00	1.49	-.63	-12.38	.00
	Emotional Wellbeing + Social Wellbeing + Psychological Wellbeing	.42	56.72		00	1.57	-0.19	-2.92	0.00
							-0.07	-1.22	0.22
							-0.48	-7.13	0.00

Table- 10d: *Regression Analysis showing the prediction of Severe Depression on Emotional Wellbeing, Social Wellbeing and Psychological Wellbeing.*

Predictor	Criterion	R^2	*F* Change	*df1*	F change Sig	Durbin-Watson	Beta	*t*	sig
Severe Depression	Emotional Wellbeing	.25	78.51	1/238	.00	1.63	-4.98	-8.86	.00
	Social Wellbeing	.08	21.40		.0	1.38	-.28	-4.63	.00
	Psychological Wellbeing	.29	100.84		.00	1.63	-.54	-10.04	.00
	Emotional Wellbeing + Social Wellbeing + Psychological Wellbeing	.34	40.02	1/236	.00	1.70	-0.25	-3.58	0.00
							-0.04	-0.67	0.51
							-0.37	-5.20	0.00

The multiple regression model with Somatic Symptoms as predictors and Emotional Wellbeing (F=189.93; p<.01), Social Wellbeing (F=45.41; p<.01) and Psychological Wellbeing (F=420.08; p<.01) as the criterion emerged to be statistically significant. The R square and the change statistics with Durbin Watson are presented in Table – 10a. The Durbin-Watson statistics revealed that Somatic symptoms as a predictor explained 44% of variances in Emotional Well-being, 16% in Social Wellbeing and 64% in Psychological Wellbeing.

The multiple regression model with Anxiety/Insomnia as predictors and Emotional Wellbeing (F=167.51; p<.01), Social Wellbeing (F=43.20; p<.01) and Psychological Wellbeing (F=319.19; p<.01) as the criterion emerged to be statistically significant. The R, R square and the change statistics with Durbin Watson are presented in Table – 10b. The Durbin-Watson statistics revealed that Anxiety/Insomnia as a predictor explains 41% of variances in Emotional Wellbeing, 15% in Social Wellbeing and 78% in Psychological Wellbeing.

The multiple regression model with Social Dysfunction as predictors and Emotional Wellbeing (F=86.73; p<.01), Social Wellbeing (F=30.92; p<.01) and Psychological Wellbeing (F=153.16; p<.01) as the criterion emerged to be statistically significant. The R, R square and the change statistics with Durbin Watson are presented in Table – 10c. The Durbin-Watson statistics revealed that Social Dysfunction as a predictor explains 27% of variances in Emotional Wellbeing, 12% in Social Wellbeing and 39% in Psychological Wellbeing.

The multiple regression model with Severe Depression as predictors and Emotional Wellbeing (F=78.51; p<.01), Social Wellbeing (F=21.40; p<.01) and Psychological Wellbeing (F=100.84; p<.01) as the criterion emerged to be statistically significant. The R, R square and the change statistics with Durbin Watson are presented in Table – 10d. The Durbin-Watson statistics revealed that Anxiety/Insomnia as a predictor explains 25% of variances in Emotional Wellbeing, 8% in Social Wellbeing and 29% in Psychological Wellbeing.

Multiple regression analysis was also employed to predict somatic symptoms, anxiety/insomnia, social dysfunction, severe depression, emotional well-being, social well-being and psychological well-being with Intelligence as predictors. The multiple regression model (Table 11) with Intelligence as a predictor

explains 74% of variances in Somatic Symptoms, 67% in Anxiety/Insomnia, 43% in Social Dysfunction, 29% in Severe Depression, 43% in Emotional Wellbeing, 17% on Social Wellbeing and 62% on Psychological Wellbeing.

These findings proved the final hypothesis that cognitive abilities had significantly predicted the dependent variables of the study i.e. somatic symptoms, anxiety/insomnia, social dysfunction, severe depression, emotional well-being, social well-being and psychological well-being. Literature suggested that deaf people with comorbidities are more susceptible to mental health problems and encountered cognitive and behavioural challenges which decreased their well-being (Hindley, 2005). The research suggested that there is a relationship between speech, adaptive behaviour and intelligence of deaf individuals (Mayberry, 2002; Kushalnagar et al., 2007). Communication difficulties triggered social dysfunction that impaired emotional wellbeing (Hindley, 2000; 2005; Horne & Pennington, 2010; Brauer et al., 1998) which subsequently led to inadequate understanding of other's emotional states, limited vocabulary and consequential thoughts (Gray, et al., 2003; Hindley, 2005; Remmel, Bettrer & Weinberg, 2003).

Table- 11 : *Showing the prediction of Intelligence on other dependent variables for the samples*

Predictor	Statistics	Somatic Symptoms	Anxiety/ Insomnia	Social Dysfunction	Severe Depression	Emotional Wellbeing	Social Wellbeing	Psychological Wellbeing
Intelligence	R^2	.74	. 67	.43	.29	.43	.17	.62

The result of the present study may be summarized as follows concerning the theoretical expectation (hypothesis) set forth for the study:

1) The present study showed that the emotional, social and psychological well-being of the DHH individuals was lower when compared to hearing individuals. Results also suggested that DHH individuals seem to have a higher level of mental health problems than normal hearing individuals. The scores on anxiety, depression, social dysfunction and somatic symptoms were higher for individuals with hearing loss. The results of the present study also suggested that normal-hearing individuals performed better in an intelligence test when compared with DHH individuals. These findings confirmed the first, second and third hypotheses set forth for the study that the level of mental well-being (Emotional Well-being, Social Well-being, Psychological Well-being) among DHH individuals would be significantly lower, whereas mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression) among DHH individuals would be significantly higher when compared to normal hearing and that normal-hearing individuals would perform significantly higher than DHH individuals on cognitive abilities (Intelligence).

2) It was found in the present study that females had higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression when compared to males and vice-versa on emotional, social and psychological wellbeing and intelligence. This confirmed the fourth hypothesis set forth for the study that mental well-being (Emotional Well-being, Social Well-being, Psychological Well-being) would be significantly higher for males than females and vice versa for mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression); males will perform significantly higher on cognitive abilities (Intelligence) than females.

3) The results of the present study revealed that young adults had higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults and vice-versa on emotional, social and psychological wellbeing and intelligence. This proves the fifth hypothesis that Young adults will have significantly higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults but significantly lower levels of emotional, social and psychological wellbeing and intelligence.

4) Results of the Pearson correlation revealed significant correlations among the dependent variables. Somatic Symptoms had a significant positive relationship with Anxiety / Insomnia, Social Dysfunction, and Severe Depression and a significant negative relationship with Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence. Anxiety / Insomnia had a significant positive correlation with Social Dysfunction, Severe Depression and a significant negative correlation with Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence. Social Dysfunction had a significant positive correlation with Severe Depression and a significant negative relationship with Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence. Significant negative correlations were found between Severe Depression and Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence. There was a significant positive relationship between Emotional Wellbeing and Social Wellbeing, Psychological Wellbeing and Intelligence. A significant positive correlation was also found between Social Wellbeing and Psychological Wellbeing and Intelligence. There was a significant positive relation between Psychological Wellbeing and Intelligence. The highest significant positive correlation was found between Somatic Symptoms and Anxiety / Insomnia whereas the highest significant negative correlation was found between Somatic Symptoms and Intelligence. The above findings proved hypothesis no. 6 set forth for the study, that there are significant relationships between the dependent variables under study.

5) Hearing Abilities have a significant independent effect with an effect size of 61% on Somatic symptoms, 57 % on Anxiety/Insomnia, 22% on Social Dysfunction, 27% on Severe Depression, 27% on Emotional Wellbeing, 14% on Social Wellbeing, 48% on Psychological Wellbeing and 55% on Intelligence. This finding supported the theoretical expectation (hypothesis) no. 7 that there will be a significant effect of hearing ability (DHH and Normal Hearing) on Mental Health factors and Intelligence. DHH scored higher on Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression than normal hearing whereas they scored lower on Emotional wellbeing, Social wellbeing, Psychological wellbeing and Intelligence when compared to Normal Hearing individuals.

6) Gender has a significant independent effect with an effect size of 22% on Somatic symptoms, 16% on Anxiety/Insomnia, 26% on Social Dysfunction and 6% on Severe Depression, 10% on Emotional Wellbeing, 5% on Social Wellbeing,

24% on Psychological Wellbeing and 22% on Intelligence. Females scored higher on somatic symptoms, Anxiety/insomnia, Social Dysfunction and Severe Depression than males whereas females scored lower on Emotional wellbeing, Social wellbeing, Psychological wellbeing and Intelligence when compared to males. This finding supported the theoretical expectation no.7 that a significant difference between males and females would be found in Mental Health and Intelligence.

7) Age has a significant independent effect with an effect size of only 2% on Somatic symptoms, 5% on anxiety/insomnia and 1% on Social Dysfunction, 3% on Emotional Wellbeing, 2% on Social Wellbeing, 2% on Psychological Wellbeing and 2% on Intelligence. Young Adults scored higher than the Middle adults on Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression while Middle adults scored higher on Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence variables. This finding is in support of hypothesis no. 7 set forth for the study that there will be a significant difference between Young Adult and Middle Adult in Mental Health factors and Intelligence.

8) Hearing Abilities and Gender has a significant interaction effect with an effect size of 83%, 74%, 49% and 34% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression respectively. Hearing Impairment and Gender also has a significant interaction effect with an effect size of 45% on Emotional Wellbeing, 24% on Social Wellbeing, 73% on Psychological Wellbeing and 78% on Intelligence. This supports hypothesis no.8 set forth for the study.

9) Hearing Abilities and Age has a significant interaction effect with an effect size of 68%, 63%, 33% and 30% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression variables respectively. Significant interaction effect of Hearing Impairment and Age was also found with an effect size of 40% on Emotional Wellbeing, 16% on Social Wellbeing, 50% on Psychological Wellbeing and 62% on Intelligence. Hypothesis no. 8 is supported by these findings.

10) The multiple regression model with Intelligence as a predictor explains 74% of variances in Somatic Symptoms, 67% in Anxiety/Insomnia, 43% in Social Dysfunction, 29% in Severe Depression, 43% in Emotional Wellbeing, 17% in Social Wellbeing and 62% on Psychological Wellbeing, which supported the final hypothesis set forth for the study.

Chapter – V

SUMMARY AND CONCLUSION

The present study entitled *"Mental Health Factors and Intelligence among Deaf and Hard of Hearing Individuals"* aimed to study the prevalence and level of mental health conditions and cognitive ability among the hearing impaired in the Mizo population. The study focused on some of the factors of mental health such as emotional, social and psychological wellbeing; on the mental health problems such as somatic symptoms, anxiety/ insomnia, social dysfunction and severe depression; and on cognitive ability comparing their prevalence between the Deaf and Hard of Hearing (DHH) and normal hearing individuals; and to determine the independent effects and interaction effect of 'hearing ability, 'gender' and 'age group' on Emotional Well-being, Social Well-being, Psychological Well-being, Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, Severe Depression and Intelligence among the target population.

It was hypothesised that the level of mental well-being being (Emotional Well-being, Social Well-being, Psychological Well-being) among DHH individuals would be significantly lower, whereas mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression) among DHH individuals would be significantly higher when compared to normal hearing and that normal-hearing individuals would perform significantly higher than DHH individuals on cognitive abilities (Intelligence). It was also predicted that mental well-being (Emotional Well-being, Social Well-being, Psychological Well-being) would be significantly higher for males than females and vice versa for mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression); males will perform significantly higher on cognitive abilities (Intelligence) than females. It was expected that Young adults will have significantly higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults but significantly lower levels of emotional, social and psychological wellbeing and intelligence. It was also hypothesised that 'hearing ability, 'gender' and 'age group' would have a significant independent effect and significant interaction effect on Emotional Well-being, Social Well-being, Psychological Well-being, Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, Severe Depression and Intelligence in the target population. Cognitive abilities were projected to predict the level of Emotional Well-being, Social Well-

being, Psychological Well-being, Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, Severe Depression and Intelligence.

To achieve the objectives and hypothesis of the study, three hundred and twenty (320) participants from different parts of Mizoram, a state in the northeast of India, comprising 160 DHH {80 females (40 young adults and 40 Middle adults) and 80 males (40 young adult and 40 middle adults)} and 160 Normal hearing {80 females (40 young adult and 40 middle adults) and 80 males (40 young adult and 40 middle adults)} of the age group 20 to 39 years (Young Adult) and 40 to 59 years (Middle Adult) were selected to serve as samples by employing multistage sampling procedure. The age range was 20-59 years which was classified into two age groups Young Adult (20-39 years) and Middle Adult (40-59 years) following the stages of psychosocial development proposed by Erikson (Erikson, 1950).

The design of the study was a 2 x 2 x 2 factorial design (2 Hearing abilities x 2 Gender x 2 Age groups). The samples were categorised into eight comparison groups, each group containing 40 subjects in each eights groups: DHH Female Young Adult (DHFYA), DHH Female Middle Adult (DHFMA), DHH Male Young Adult (DHMYA), DHH Male Middle Adult (DHMMA), Normal Hearing Female Young Adult (NHFYA), Normal Hearing Female Middle Adult (NHFMA), Normal Hearing Male Young Adult (NHMYA) and Normal Hearing Male Middle Adult (NHMMA).

The Mental Health Continuum – Short Form (MHC – SF; Keyes, 2005), General Health Questionnaire – 28 (GHQ – 28; Goldberg, 1978) and Raven's Standard Progressive Matrices (SPM; Raven et al, 1992) were employed for psychological evaluation of the samples, all prescribed instructions are given in the manuals and APA guidelines for research were followed.

Sample Characteristics

The sample was categorised based on their hearing abilities consisting of 160 DHH and 160 Normal hearing individuals. Each of these two groups consisted of 80 males and 80 females which are again equally categorised based on their age group into Young Adults and Middle Adults as seen in Figures 2 to 4. The whole sample is distributed into eight equal comparison groups viz. DHH Female Young Adult (DHFYA), DHH Female Middle Adult (DHFMA), DHH Male Young Adult

(DHMYA), DHH Male Middle Adult (DHMMA), Normal Hearing Female Young Adult (NHFYA), Normal Hearing Female Middle Adult (NHFMA), Normal Hearing Male Young Adult (NHMYA) and Normal Hearing Male Middle Adult (NHMMA), each group containing 40 subjects.

Subject-wise scores on items of the Mental Health Continuum – Short Form (MHC – SF; Keyes, 20005), General Health Questionnaire – 28 (GHQ – 28; Goldberg, 1978) and Raven's Standard Progressive Matrices (SPM; Raven et al, 1992) were prepared for the whole samples - DHH Female Young Adult (DHFYA), DHH Female Middle Adult (DHFMA), DHH Male Young Adult (DHMYA), DHH Male Middle Adult (DHMMA), Normal Hearing Female Young Adult (NHFYA), Normal Hearing Female Middle Adult (NHFMA), Normal Hearing Male Young Adult (NHMYA) and Normal Hearing Male Middle Adult (NHMMA).

Results Analysis of the present study was done in a phased manner:

1) Checking of missing raw data and outliers,
2) Psychometric adequacy of the Psychological scales – Reliability and Homogeneity,
3) Descriptive statistics,
4) Relationship between the behavioural measures.
5) Prediction – ANOVA and Regression.

1) Checking of missing raw data and outlier

The raw data set was checked for missing raw data and extreme outliers. Since there were no missing data or extreme outliers, further analysis was carried on.

2) Psychometric adequacy of the Psychological scales

Psychometric analyses of the scales and subscales were done by employing Microsoft Office Excel 2013 and IBM's Statistical Package for the Social Sciences (SPSS 26). The psychological scales used in the present study were originally constructed for a different culture. Thus, it is essential to check that the scales are appropriate for the present study to verify the trustworthiness of the scales for the population under study.

The reliabilities of all the subscales i.e., (i) Somatic Symptoms, (ii) Anxiety/insomnia, (iii) Social Dysfunction, (iv) Severe Depression, (v) Emotional Well-being, (vi) Social Well-being, and (vii) Psychological Well-being in the present study were calculated using Cronbach's Alpha. Table-1 shows the reliability for the four subscales of GHQ-28 i.e., somatic symptoms, anxiety/insomnia, social dysfunction and severe depression subscales; and three subscales of MHC-SF i.e., emotional well-being, social well-being and psychological well-being subscales.

The internal consistency of the scales was calculated using Cronbach's Alpha and all the scales and subscales were found to be highly reliable (Table 1). The Somatic Symptom subscale consists of 7 items (α = .84), the Anxiety/Insomnia subscale consists of 7 items (α = .91), the Social Dysfunction subscale consists of 7 items (α = .89) and the Severe Depression subscale consists of 7 items (α = .82) of the GHQ-28 appeared to have good internal consistency. Cronbach's alphas for the 3 Emotional Wellbeing, 5 Social Wellbeing and 6 Psychological Wellbeing items of the MHC-SF Scale were .87, .83 and .87 respectively. Cronbach's Alpha for the RSPM scale was .73.

Levene's Test of Equality of variances and Browne Forsythe tests were employed for the assumptions of homogeneity of variances. Levene's test examined whether the variances of the samples under study are approximately equal. Table 1 shows that the significances of Levene's Test of Equality of variances for each of the subscales or scales under study are greater than .05, which is non-significant. This indicated that the assumptions of homogeneity of variance have been met. Brown-Forsythe Robust tests (for equality of means) are all statistically significant for all the scales and subscales as their p-values are less than 0.05. Thus, further statistical analyses can be continued as the results indicated the appropriateness of the scales/ subscales.

3) Descriptive Statistics (Mean, SD, Skewness, Kurtosis)

The descriptive statistics of the raw data consisting of the Mean, Standard Deviation, Skewness and Kurtosis are indices for normality of the scores of the population under study on the measured variables. To test the assumption of normality, skewness and kurtosis were analysed. The results showed that the samples are normally distributed.

The mean score on Somatic symptoms variables indicated that the mean scores of DHH Female Young adults were highest (*M* = 20.33, *SD* = .99) whereas that of Normal Hearing Female Middle adults was the lowest (*M* = 11.93, *SD* =1.14). The mean score on Anxiety/Insomnia variables also indicated that the mean scores of DHH Female Young adults were highest (*M* = 20.93, *SD* = 2.24) whereas that of Normal Hearing Female Middle adults was the lowest (*M* = 9.67, *SD* =1.42). The mean score of DHH Female Young adult (*M* = 26.13, *SD* = 1.72) on Social Dysfunction variables was the highest among the group while that of Normal Hearing Male Middle Adult (*M* = 16.47, *SD* = 2.10) was the lowest. The mean score of DHH Female Young Adult was highest (*M* = 19.00, *SD* = 2.05) whereas that of Normal Hearing Male Middle Adult was lowest (*M* = 12.43, *SD* = 3.58). Compared to the previous variables, the mean score reversed in the case of Emotional Wellbeing variables where Normal Hearing Male Middle Adult's mean score was highest (*M* = 15.47, *SD* = 2.24) and the lowest score was that of DHH Female Young Adult (*M* = 8.27, *SD* = 3.00). The highest mean score was that of Normal Hearing Male Young Adult (*M* = 22.93, *SD* = 3.36) and the lowest was that of DHH Female Young Adult (*M* = 15.77, *SD* = 3.15) on Social Wellbeing variables. Normal Hearing Male Middle Adult has the highest mean score of 31.90 (*SD* = 2.22) on Psychological Wellbeing variables whereas DHH Female Young Adult (*M* = 20.37, *SD* = 2.47) scored the lowest. The mean score on Intelligence showed that Normal Hearing Male Middle Adult (*M* = 44.37, *SD* = 5.01) has the highest score whereas DHH Female Young Adult (*M*= 16.90, *SD* = 2.55) scored the lowest.

Considering the whole sample, the mean scores on the dependent variables were 17.17 (SD = 3.24) for Somatic Symptoms variables, 15.85 (SD = 3.95) for Anxiety/Insomnia variables, 20.55 (SD = 3.67) for Social Dysfunction variables, 15.12 (SD = 3.78) for Severe Depression, 11.95 (SD = 3.07) for Emotional Wellbeing variables, 21.13 (SD = 4.27) for Social Wellbeing variables, 26.82 (SD = 4.27) for Psychological Wellbeing variables and 31.23 (SD = 9.50) for Intelligence variables.

Individuals with hearing impairment scored higher than the Normal Hearing individuals on Somatic Symptoms, Anxiety / Insomnia, Social Dysfunction and Severe Depression variables whereas scores of Normal Hearing Individuals were higher than the DHH on Emotional Wellbeing, Social Wellbeing, Psychological

Wellbeing and Intelligence variables. Gender wise, the scores of Females were higher on Somatic Symptoms, Anxiety / Insomnia, Social Dysfunction and Severe Depression while males scored higher on Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence variables. In terms of Age group, the Young Adult scored higher than the Middle Adult on Somatic Symptoms, Anxiety / Insomnia, Social Dysfunction and Severe Depression while Middle Adult scored higher on Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence variables.

Results suggested that DHH individuals seem to have a higher level of mental health problems than normal hearing individuals. The scores on anxiety, depression, social dysfunction and somatic symptoms were higher for individuals with hearing loss. These results corresponded to the findings of the previous researcher that the prevalence of mental health problems was higher in individuals with hearing loss (Abbas et al., 2019; Istad et al., 2019; Clarke et al., 2019). Clarke and his colleagues (2019) suggested that hearing loss leads to anxiety that impacted sleeping habits, stress, social isolation and depression. Several pieces of research linked hearing loss with the prevalence of anxiety and elevated risk of depression (Abbas et al. 2019; Eleuteri et al., 2010; Knutson, Johnson, & Murray, 2006; Kobosko et al., 2018). Previous studies had also linked social isolation with hearing loss which led to poor mental health (Baldridge & Kulkarni, 2017; Dawes et al., 2015; Heffernan et al., 2019; Stevenson et al., 2017). Knutson and friends (2006) found increased levels of social introversion and loneliness in DHH individuals.

The present study had also shown that the emotional, social and psychological wellbeing of the DHH individuals were lower when compared to hearing individuals. These findings are commensurate with previous research findings that implicate emotional, social and psychological wellbeing with hearing impairment (Lucas, Katiri and Kitterick, 2017). Hearing loss not only affected the relationship and social exclusion but also lowered self-esteem, which consequently affected mental health and wellbeing (Fellinger et al., 2009; Ridgeway, 1997). The results of the present study also suggested that normal-hearing individuals performed better in an intelligence test when compared with DHH individuals. This finding was in congruence with the findings of the previous intelligence research which found

lower intelligence performances of the DHH individuals (Huber and Kipman, 2012; Myklebust, 1960; Pronovost et al., 1976).

These findings confirmed the first, second and third hypotheses set forth for the study that the level of mental well-being (Emotional Well-being, Social Well-being, Psychological Well-being) among DHH individuals would be significantly lower, whereas mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression) among DHH individuals would be significantly higher when compared to normal hearing and that normal-hearing individuals would perform significantly higher than DHH individuals on cognitive abilities (Intelligence).

It was found in the present study that females had higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression when compared to males and vice-versa on emotional, social and psychological wellbeing and intelligence. Previous studies suggested that women suffered more mental health such as anxiety and depression than their male counterparts (Copeland et al., 1999; Sonnenberg, Beekman, Deeg, & van Tilburg, 2000; Zunzunegui, Alvarado, Béland, & Vissandjee, 2009). Sonnenberg and colleagues (2000) had shown that the prevalence of depression was doubled in women when compared to men in the adult population. This confirmed the fourth hypothesis set forth for the study that mental well-being (Emotional Well-being, Social Well-being, Psychological Well-being) would be significantly higher for males than females and vice versa for mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression); males will perform significantly higher on cognitive abilities (Intelligence) than females.

The results of the present study revealed that young adults had higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults and vice-versa on emotional, social and psychological wellbeing and intelligence. This proves the fifth hypothesis that Young adults will have significantly higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults but significantly lower levels of emotional, social and psychological wellbeing and intelligence. However, the finding of the present study is in contrast with the previous findings of McCrone and

colleagues (2008) which reported that older people were more prone to suffer from depression, social dysfunction and declining physical health. Older adults were found to be more likely to experience insomnia (Jean-Louis, et al., 2001; Klink, et al., 1992; Ohayon, 1996).

4) Relationship between the Behavioural measures

Bivariate correlation (Pearson Correlation) was employed to determine the significant relationship between the dependent variables. Results of the Pearson correlation revealed significant correlations among the dependent variables.

Somatic Symptoms had a significant positive relationship with Anxiety / Insomnia (r = .82, p < .01), Social Dysfunction (r = .69, p < .01), Severe Depression (r = .56, p < .01) and a significant negative relationship with Emotional Wellbeing (r = -.66, p < .01), Social Wellbeing (r = -.40, p < .01), Psychological Wellbeing (r = -.79, p < .01) and Intelligence (r = -.86, p < .01).

Anxiety / Insomnia had a significant positive correlation with Social Dysfunction (r = .624, p < .01), Severe Depression (r = .512, p < .01) and a significant negative correlation with Emotional Wellbeing (r = -.64, p < .01), Social Wellbeing (r = -.39, p < .01), Psychological Wellbeing (r = -.77, p < .01) and Intelligence (r = -.81, p < .01).

Social Dysfunction had a significant positive correlation with Severe Depression (r = .41, p < .01) and significant negative relationship with Emotional Wellbeing (r = -.51, p < .01), Social Wellbeing (r = -.34, p < .01), Psychological Wellbeing (r = -.62, p < .01) and Intelligence (r = -.657, p < .01).

Significant negative correlations were found between Severe Depression and Emotional Wellbeing (r = -.498, p < .01), Social Wellbeing (r = -.291, p < .01), Psychological Wellbeing (r = -.54, p < .01) and Intelligence (r = -.53, p < .01).

There was a significant positive relationship between Emotional Wellbeing and Social Wellbeing (r = .36, p < .01), Psychological Wellbeing (r = .63, p < .01) and Intelligence (r = .65, p < .01).

Significant positive correlation was also found between Social Wellbeing and Psychological Wellbeing (r = .42, p < .01) and with Intelligence (r = .41, p < .01).

There was a significant positive relation between Psychological Wellbeing and Intelligence ($r = .79$, $p < .01$).

Highest significant positive correlation was found between Somatic Symptoms and Anxiety / Insomnia ($r = .82$, $p < .01$) whereas the highest significant negative correlation was found between Somatic Symptoms and Intelligence ($r = -.86$, $p < .01$).

Literature suggested that the relationship between mental health and social factors is bidirectional, and vice versa (Bährer-Kohler, 2012). Previous studies attributed depression to chronic health problems, decreased physical activities, social isolation and decreased family interactions (Grundy et al., 2013). A study by Grundy and colleagues (2013) linked social isolation in the elderly to poor mental health such as depression, suicidal ideation, and even death. Cognitive and physical impairments, social isolation, depression and stress are contributing factors to anxiety (Vink et al., 2008). Depression in older people impacted physical wellbeing and quality of life (Fiske et al., 2009). Chu and colleagues (2016) correlated insomnia with loneliness.

Spearman correlation was calculated to examine the relationship of demographics such as Hearing Abilities, Gender and Age Group with dependent variables. The result as shown in Table 5 indicated that there were several significant relationships among them.

Hearing Abilities had a significant negative correlation with Somatic Symptoms ($r = -.82$, $p < .01$), Anxiety / Insomnia ($r = -.79$, $p < .01$), Social Dysfunction ($r = -.47$, $p < .01$) and Severe Depression ($r = -.53$, $p < .01$) and a significant positive relationship with Emotional Wellbeing ($r = .59$, $p < .01$), Social Wellbeing ($r = .37$, $p < .01$), Psychological Wellbeing ($r = .72$, $p < .01$).

Gender had a significant negative correlation with Somatic Symptoms ($r = -.42$, $p < .01$), Anxiety / Insomnia ($r = -.36$, $p < .01$), Social Dysfunction ($r = -.50$, $p < .01$) and Severe Depression ($r = -.22$, $p < .01$) and a significant positive relationship with Emotional Wellbeing ($r = .29$, $p < .01$), Social Wellbeing ($r = .19$, $p < .01$), Psychological Wellbeing ($r = .49$, $p < .01$).

Age had a significant negative correlation with Anxiety / Insomnia (r = -.19, p < .01) and Social Dysfunction (r = -.20, p < .01) and a significant positive relationship with Social Wellbeing (r = -.36, p < .05).

The highest significant positive correlation was found between Hearing Abilities and Psychological Wellbeing (r = .72, p < .01) whereas the highest significant negative correlation was found between Hearing Impairment and Somatic Symptoms (r = -.82, p < .01).

Literature addressed the prevalence of anxiety and depression in DHH individuals (Abbas et al., 2019; Eleuteri et al., 2010; Knutson et al., 2006; Kobosko et al., 2018). Hearing abilities and psychosocial wellbeing were found to be correlated and are influenced by variables such as age, ethnicity and other social factors (Chen, 1994; Ives, Bonino, et al., 1995; Nachtegaal et al., 2009; Pronk et al., 2011). Hawthorne (2008) found young adults were more socially alienated than middle adults. Hearing loss was considerably linked to decreased social functioning by Eleuteri and colleagues (2010) in the adult population. DHH individuals were found to be more vulnerable to physical symptoms associated with anxiety and insomnia (Clarke, Hoare, & Killan, 2019).

(5) Prediction of Independent on Dependent Variables (ANOVA, Post hoc mean comparision, Regression)

Analysis of variance indicated the significant independent effects of the independent variables of ‘Hearing Abilities’, ‘Gender’ and ‘Age Group’ on the dependent variables and also the significant interaction effect of ‘Hearing Abilities x Gender x Age Group’ on the dependent variables for the whole sample.

2x2x2 Factorial ANOVA was employed to examine the independent effects and interaction effects of Hearing Impairment, Gender and Age group on the dependent variables. Hearing Abilities have a significant independent effect with an effect size of 61% on Somatic symptoms, 57 % on Anxiety/Insomnia, 22% on Social Dysfunction and 27% on Severe Depression variables. Gender has a significant independent effect with an effect size of 22% on Somatic symptoms, 16% on Anxiety/Insomnia, 26% on Social Dysfunction and 6% on Severe Depression variables. Age has a significant independent effect with an effect size of only 2% on

Somatic symptoms, 5% on anxiety/insomnia and 1% on Social Dysfunction variables.

Significant interaction effects of Hearing Abilities, Gender and Age on the dependent variables were also found. Hearing Abilities and Gender has a significant interaction effect with an effect size of 83%, 74%, 49% and 34% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression respectively. Hearing Abilities and Age has a significant interaction effect with an effect size of 68%, 63%, 33% and 30% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression variables respectively. Gender and Age have a significant interaction effect with an effect size of 78%, 23%, 36% and 9% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression variables respectively. Hearing Abilities, Gender and Age has a significant interaction effect with an effect size of 90%, 81%, 60% and 38% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression respectively.

Hearing Abilities, Gender and Age have significant independent and interaction effects on Emotional Wellbeing, Social Wellbeing and Psychological Wellbeing. Hearing Abilities had a significant independent effect with an effect size of 27% on Emotional Wellbeing, 14% on Social Wellbeing and 48% on Psychological Wellbeing. Gender has a significant independent effect with an effect size of 10% on Emotional Wellbeing, 5% on Social Wellbeing and 24% on Psychological Wellbeing. Age has a significant independent effect with an effect size of 3% on Emotional Wellbeing, 2% on Social Wellbeing and 2% on Psychological Wellbeing.

Hearing Abilities and Gender has a significant interaction effect with an effect size of 45% on Emotional Wellbeing, 24% on Social Wellbeing and 73% on Psychological Wellbeing. Significant interaction effect of Hearing Abilities and Age was found with an effect size of 40% on Emotional Wellbeing, 16% on Social Wellbeing and 50% on Psychological Wellbeing. A significant interaction effect between Gender and Age was found with an effect size of 16% on Emotional Wellbeing, 10% on Social Wellbeing and 27% on Psychological wellbeing. A significant interaction effect between Hearing Abilities, Gender and Age were found

with an effect size of 50% on Emotional Wellbeing, 30% on Social Wellbeing and 76% on Psychological Wellbeing.

The results of the ANOVA proved the seventh and eighth hypotheses set forth for the present study. Hearing ability and Gender had a significant interaction effect on the dependent variables. Hearing abilities and Age Group also had a significant interaction effect on the dependent variables. These findings were in congruence with previous research findings. Tambs (2004) associated hearing abilities with mental health effects, such as anxiety, depression and well-being in adults and found that the mental health factors of young and middle-aged DHH were more positively correlated with hearing loss than among older DHH adults. The probability of DHH individuals showing signs of anxiety and depression was higher than normal hearing individuals (Shoham, et al., 2019). Hearing impairment was found to impact psychological, emotional and social well-being and affected social interaction (Lucas, Katiri and Kitterick, 2017). Poor communication was correlated to poor psychosocial functioning (Black and Glickman 2005). Women were found to suffer more mental health problems such as depression and anxiety when compared to men (Copeland et al., 1999; Sonnenberg et al., 2000; Zunzunegui et al., 2009).

Mean differences between the Comparision Groups (Post Hoc Analysis: Scheffe's Test) on Mental health variables.

The Post-hoc multiple mean comparisons employing Scheffe's test were conducted between DHH Female Young Adult (DHFYA), DHH Female Middle Adult (DHFMA), DHH Male Young Adult (DHMYA), DHH Male Middle Adult (DHMMA), Normal Hearing Female Young Adult (NHFYA), Normal Hearing Female Middle Adult (NHFMA), Normal Hearing Male Young Adult (NHMYA) and Normal Hearing Male Middle Adult (NHMMA) on the dependent variables, which revealed significant mean differences between most of the groups. The highest significant mean difference was found between DHHMYA and DHHMMA (12.27) on Somatic symptoms variables. On the Anxiety/ insomnia, Social Dysfunction, Severe Depression and Emotional Wellbeing variables, the highest significant mean difference was found between DHHFYA and DHHMMA. The highest significant means difference was found between DHHFYA and NHFMA (-8.03) on Social Wellbeing. On Psychological Wellbeing variables, the highest significance means difference was between DHHFYA and NHMMA (-11.53).

ANOVA (Non-Parametric Test: Kruskal - Wallis H Test) on Intelligence

Since the RSPM scale is a performance test and violated assumptions for parametric tests, a non-parametric test i.e., Kruskal - Wallis H tests was employed to evaluate the differences between the different comparison groups on the intelligence variables. Results of the independent samples Kruskal - Wallis H test are presented in Table – 8.

A Kruskal-Wallis H test showed that there was a statistically significant difference in the level of intelligence between DHH and normal hearing individuals, $\chi^2(1) = 142.285$, $p = .000$, with a mean rank score of 67.07 for DHH individuals and 173.93 for Normal Hearing individuals. The result also revealed a statistically significant difference in the level of intelligence between females and males, $\chi^2(1) = 45.433$, $p = .000$, with a mean rank score of 90.31 for females and 150.69 for males. The result of the Kruskal Wallis H test between Young adults and Middle Adults in the level of intelligence revealed statistically insignificant differences, $\chi^2(1) = 3.422$, $p = .064$, with a mean rank score of 111.79 for Young Adults and 128.38 for Middle Adults.

Statistically significant differences, $\chi^2(3) = 187.908$, $p = .000$ were found in the level of intelligence across the mean rank scores of 38.83 for DHH females, and 95.31 for DHH males, 141.78 for normal hearing females, and 206.08 for normal hearing males. The result also revealed a statistically significant difference in the level of intelligence among DHH females, DHH Male, NH females and NH Male, $\chi^2(3) = 157.617$, $p = .000$, with a mean rank score of 44.31 for DHH females, 89.83 for DHH males, 141.78 for NH females and 183.78 for NH males. The result of the Kruskal Wallis H test across Gender x Age Group in the level of intelligence revealed statistically insignificant differences, $\chi^2(3) = 58.842$, $p = .000$, with a mean rank score of 72.25 for Female Young Adults, 108.37 for Female Middle Adults, 136.13 for Male Young Adults and 165.25 for Male Middle Adults.

The results of the Kruskal-Wallis H Test showed that there was a statistically significant difference in the level of intelligence across Hearing Ability x Gender x Age Group, $\chi^2(1) = 142.285$, $p = .000$, with a mean rank score of 17.45 for DHHFYA, 60.22 for DHHFMA, 71.17 for DHHMYA, 119.45 for DHHMMA, 127.05 for NHFYA, 156.52 for NHFMA, 201.10 for NHMYA and 211.05 for NHMMA.

The mean rank score of NHMMA is the highest (211.05) whereas DHHFYA has the lowest mean rank score (17.45).

Post hoc mean comparision (Mann-Whitney U Test) on Intelligence

Pairwise comparison was done using the Mann-Whitney U test to evaluate the differences between the group samples on the level of Intelligence. The result revealed that the level of intelligence for the Normal Hearing individuals is significantly higher than DHH individuals, U = 788.5, p = .000. The Mann-Whitney test revealed that the level of intelligence was greater among males than females, U = 3577, p = .000. There was no significant effect of Age group on the level of intelligence, U = 6189, p = .064.

(6) Prediction of Behavioural measures (Regression Analysis)

For the prediction of Emotional Wellbeing, Social Wellbeing and Psychological Wellbeing from the behavioural measures of Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression, Multiple regression analyses were employed which attempted to determine the antecedents and the consequences relationship among the behavioural measures of the theoretical construct as envisioned. The multiple regression model with Somatic Symptoms as predictors and Emotional Wellbeing (F=189.93; p<.01), Social Wellbeing (F=45.41; p<.01) and Psychological Wellbeing (F=420.08; p<.01) as the criterion emerged to be statistically significant. The Durbin-Watson statistics revealed that Somatic symptoms as a predictor explained 44% of variances in Emotional Wellbeing, 16% in Social Wellbeing and 64% in Psychological Wellbeing.

The multiple regression model with Anxiety/Insomnia as predictors and Emotional Wellbeing (F=167.51; p<.01), Social Wellbeing (F=43.20; p<.01) and Psychological Wellbeing (F=319.19; p<.01) as the criterion emerged to be statistically significant. The R, R square and the change statistics with Durbin Watson are presented in Table – 10b. The Durbin-Watson statistics revealed that Anxiety/Insomnia as a predictor explains 41% of variances in Emotional Wellbeing, 15% in Social Wellbeing and 78% in Psychological Wellbeing.

The multiple regression model with Social Dysfunction as predictors and Emotional Wellbeing (F=86.73; p<.01), Social Wellbeing (F=30.92; p<.01) and Psychological Wellbeing (F=153.16; p<.01) as the criterion emerged to be

statistically significant. The R, R square and the change statistics with Durbin Watson are presented in Table – 10c. The Durbin-Watson statistics revealed that Social Dysfunction as a predictor explains 27% of variances in Emotional Wellbeing, 12% in Social Wellbeing and 39% in Psychological Wellbeing.

The multiple regression model with Severe Depression as predictors and Emotional Wellbeing (F=78.51; p<.01), Social Wellbeing (F=21.40; p<.01) and Psychological Wellbeing (F=100.84; p<.01) as the criterion emerged to be statistically significant. The R, R square and the change statistics with Durbin Watson are presented in Table – 10d. The Durbin-Watson statistics revealed that Anxiety/Insomnia as a predictor explains 25% of variances in Emotional Wellbeing, 8% in Social Wellbeing and 29% in Psychological Wellbeing.

Multiple regression analysis was also employed to predict somatic symptoms, anxiety/insomnia, social dysfunction, severe depression, emotional well-being, social well-being and psychological well-being with Intelligence as predictors. The multiple regression model (Table 11) with Intelligence as a predictor explains 74% of variances in Somatic Symptoms, 67% in Anxiety/Insomnia, 43% in Social Dysfunction, 29% in Severe Depression, 43% in Emotional Wellbeing, 17% in Social Wellbeing and 62% on Psychological Wellbeing.

These findings proved the final hypothesis that cognitive abilities had significantly predicted the dependent variables of the study i.e. somatic symptoms, anxiety/insomnia, social dysfunction, severe depression, emotional well-being, social well-being and psychological well-being. Literature suggested that deaf people with comorbidities are more susceptible to mental health problems and encountered cognitive and behavioural challenges which decreased their well-being (Hindley, 2005). The research suggested that there is a relationship between speech, adaptive behaviour and intelligence of deaf individuals (Mayberry, 2002; Kushalnagar et al., 2007). Communication difficulties triggered social dysfunction that impaired emotional wellbeing (Hindley, 2000; 2005; Horne & Pennington, 2010; Brauer et al., 1998) which subsequently led to inadequate understanding of other's emotional states, limited vocabulary and consequential thoughts (Gray, et al., 2003; Hindley, 2005; Remmel, Bettrer & Weinberg, 2003).

The result of the present study has been summarized as follows concerning the theoretical expectation (hypothesis) set forth for the study:

1) The present study showed that the emotional, social and psychological well-being of the DHH individuals was lower when compared to hearing individuals. Results also suggested that DHH individuals seem to have a higher level of mental health problems than normal hearing individuals. The scores on anxiety, depression, social dysfunction and somatic symptoms were higher for individuals with hearing loss. The results of the present study also suggested that normal-hearing individuals performed better in an intelligence test when compared with DHH individuals. These findings confirmed the first, second and third hypotheses set forth for the study that the level of mental well-being (Emotional Well-being, Social Well-being, Psychological Well-being) among DHH individuals would be significantly lower, whereas mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression) among DHH individuals would be significantly higher when compared to normal hearing and that normal-hearing individuals would perform significantly higher than DHH individuals on cognitive abilities (Intelligence).

2) It was found in the present study that females had higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression when compared to males and vice-versa on emotional, social and psychological wellbeing and intelligence. This confirmed the fourth hypothesis set forth for the study that mental well-being (Emotional Well-being, Social Well-being, Psychological Well-being) would be significantly higher for males than females and vice versa for mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression); males will perform significantly higher on cognitive abilities (Intelligence) than females.

3) The results of the present study revealed that young adults had higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults and vice-versa on emotional, social and psychological wellbeing and intelligence. This proves the fifth hypothesis that Young adults will have significantly higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults but significantly lower levels of emotional, social and psychological wellbeing and intelligence.

4) Results of the Pearson correlation revealed significant correlations among the dependent variables. Somatic Symptoms had a significant positive relationship with Anxiety / Insomnia, Social Dysfunction, and Severe Depression and a significant negative relationship with Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence. Anxiety / Insomnia had a significant positive correlation with Social Dysfunction, Severe Depression and a significant negative correlation with Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence. Social Dysfunction had a significant positive correlation with Severe Depression and a significant negative relationship with Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence. Significant negative correlations were found between Severe Depression and Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence. There was a significant positive relationship between Emotional Wellbeing and Social Wellbeing, Psychological Wellbeing and Intelligence. A significant positive correlation was also found between Social Wellbeing and Psychological Wellbeing and Intelligence. There was a significant positive relation between Psychological Wellbeing and Intelligence. The highest significant positive correlation was found between Somatic Symptoms and Anxiety / Insomnia whereas the highest significant negative correlation was found between Somatic Symptoms and Intelligence. The above findings proved hypothesis no. 6 set forth for the study, that there are significant relationships between the dependent variables under study.

5) Hearing Abilities have a significant independent effect with an effect size of 61% on Somatic symptoms, 57 % on Anxiety/Insomnia, 22% on Social Dysfunction, 27% on Severe Depression, 27% on Emotional Wellbeing, 14% on Social Wellbeing, 48% on Psychological Wellbeing and 55% on Intelligence. This finding supported the theoretical expectation (hypothesis) no. 7 that there will be a significant effect of hearing ability (DHH and Normal Hearing) on Mental Health factors and Intelligence. DHH scored higher on Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression than normal hearing whereas they scored lower on Emotional wellbeing, Social wellbeing, Psychological wellbeing and Intelligence when compared to Normal Hearing individuals.

6) Gender has a significant independent effect with an effect size of 22% on Somatic symptoms, 16% on Anxiety/Insomnia, 26% on Social Dysfunction and 6% on Severe Depression, 10% on Emotional Wellbeing, 5% on Social Wellbeing,

24% on Psychological Wellbeing and 22% on Intelligence. Females scored higher on somatic symptoms, Anxiety/insomnia, Social Dysfunction and Severe Depression than males whereas females scored lower on Emotional wellbeing, Social wellbeing, Psychological wellbeing and Intelligence when compared to males. This finding supported the theoretical expectation no.7 that a significant difference between males and females would be found in Mental Health and Intelligence.

7) Age has a significant independent effect with an effect size of only 2% on Somatic symptoms, 5% on anxiety/insomnia and 1% on Social Dysfunction, 3% on Emotional Wellbeing, 2% on Social Wellbeing, 2% on Psychological Wellbeing and 2% on Intelligence. Young Adults scored higher than the Middle adults on Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression while Middle adults scored higher on Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence variables. This finding is in support of hypothesis no. 7 set forth for the study that there will be a significant difference between Young Adult and Middle Adult in Mental Health factors and Intelligence.

8) Hearing Abilities and Gender has a significant interaction effect with an effect size of 83%, 74%, 49% and 34% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression respectively. Hearing Impairment and Gender also has a significant interaction effect with an effect size of 45% on Emotional Wellbeing, 24% on Social Wellbeing, 73% on Psychological Wellbeing and 78% on Intelligence. This supports hypothesis no.8 set forth for the study.

9) Hearing Abilities and Age has a significant interaction effect with an effect size of 68%, 63%, 33% and 30% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression variables respectively. Significant interaction effect of Hearing Impairment and Age was also found with an effect size of 40% on Emotional Wellbeing, 16% on Social Wellbeing, 50% on Psychological Wellbeing and 62% on Intelligence. Hypothesis no. 8 is supported by these findings.

10) The multiple regression model with Intelligence as a predictor explains 74% of variances in Somatic Symptoms, 67% in Anxiety/Insomnia, 43% in Social Dysfunction, 29% in Severe Depression, 43% in Emotional Wellbeing, 17% in Social Wellbeing and 62% on Psychological Wellbeing, which supported the final hypothesis set forth for the study.

Limitations

The findings of this study have to be seen in the light of some limitations. The first limitation was sample bias or selection bias. Identification of the sample was challenging as there were no institutions or organizations that accurately maintained the list of DHH individuals in the state. This impacted the selection process of the participants for the study which was based on multistage random sampling and inevitably impacted the sample size. Therefore the findings of this study may not be truly representative of the population.

Another limitation is the lack of research in the area of hearing impairment in the state. There was little or no article or literature that is relevant for the understudied population as there was no prior research study in this area in the Mizo population. Thus, all research studies that are cited in this study are from other cultures. However, this study may be an important opportunity to fill the gaps in prior literature and may present the need for further development in this area of study in the state of Mizoram.

Data collection was another challenging area of this study. Although the data collection was done with the help of trained persons in the area of hearing impairment, not all deaf and hard of hearing participants could read or were familiar with Sign language. This led to difficulty in communication and may have impacted their responses which would have affected the results of the study.

Demographic variables such as causes, level, type and onset of hearing loss were initially an area of interest in the present study however were not considered for the study due to insufficient and vague input. Comorbidity of disability was also another area of interest that was not taken into consideration for the study. A study on these aspects would have provided a greater understanding for further intervention in the treatment of the deaf and hard of hearing population.

Suggestions for Future Studies

Taking into consideration the limitations of the present study, identification and maintenance of the accurate list of deaf and hard of hearing populations in the state are required for future studies. Demographic variables such as educational background, type of family, employment status or socioeconomic status may be

important variables that should be taken into consideration in future. The causes, type, level and onset of hearing loss may also play important variables in the study.

Correlational or longitudinal studies on risk factors and comorbidities of hearing loss are required for a better understanding of the wellbeing of the deaf and hard of hearing population. Research on extensive clinical psychological studies of the deaf and hard and hearing population would give more insights into the understanding of their mental health problems, as this population needs more intervention of mental health treatment than the normal-hearing population.

Hearing loss individuals had several challenges in accessing mental and physical health care services. More intervention is necessary for the health care services provided for the deaf and hard of hearing individuals, as they are more prone to social isolation due to communication difficulties that led to a misunderstanding of their problems and misdiagnosis in the treatment they received.

The results from this study may shine a light on the application of strategic intervention and psychological treatment of deaf and hard-of-hearing individuals.

Significance of the study

The present study consented to the suggestions of several prior pieces of research that highlighted the prevalence of mental health problems among the deaf and hard of hearing population. This study revealed that the prevalence of mental health problems is higher among deaf and hard of hearing individuals than in the normal hearing population in Mizoram. This is the pioneer study in the field of mental health among the deaf and hard of hearing population in the state of Mizoram, according to the knowledge of the researcher.

Another significance of the present study is the awareness of the presence of mental health problem comorbidities in individuals with hearing loss, and that they are more prone to suffer from mental health conditions. They are also more likely to socially isolate themselves due to communication difficulties, which may lead to more risk factors for mental health problems.

As indicated in the study, individuals with hearing loss have difficulties in access to mental health services as there is no mental health specialist in Mizoram who are expertise in the area of treating hearing loss patients. This led to a

misunderstanding of the exact problem and misdiagnosis or over-diagnosis of the problem. The need for mental health specialist who is also expertise in the field of hearing loss is inevitably essential.

The study highlighted the level of intelligence stating that the deaf and hard-of-hearing individuals performed lower than the normal-hearing population. This may apply to solving certain problems in life such that individuals with hearing loss might find it harder to solve certain challenges that might not be very hard for hearing individuals. This proved the need for extending more care and services to the hearing loss population.

The study highlighted the need for mental health intervention in the deaf and hard of hearing population. Although several clinics and hospitals may give services in terms of physical needs, the mental health aspects of these individuals cannot be overruled. This study revealed that they are the ones who suffered more mental health problems and thus, they are the ones who are more in need of mental health care. The researcher believes that this study might bring light in such a way that the mental health problems of the deaf and hard of hearing might be heard.

APPENDICES

APPENDIX – I

DEMOGRAPHIC PROFILE

*You are kindly requested to please fill in/tick the following responses which is intended to be used for research purpose in Mizoram University. You are not required to write your name. The information provided will be **Confidential** and solely be used for research purposes only. There are no right or wrong responses, Please be honest in providing responses that you think truly describes you. Thank you.*

1. Age:	_____ years
2. Gender:	☐ Male / ☐ Female
3. Education:	☐ Uneducated / ☐ Below Matric / ☐ Matric / ☐ Higher Secondary / ☐ Graduate / ☐ Post-Graduate
4. Marital Status:	☐ Single / ☐ Married / ☐ Divorced
5. Occupation:	☐ Employed / ☐ Unemployed
6. Family Income (per month):	☐ Below 25000/ ☐ 25000-75000/ ☐ Above 75000
7. Address:	
8. Are you suffering from hearing loss?	☐ No / ☐ Yes

*If you suffer from hearing loss, kindly continue to fill/ tick the following responses in **Sl. 9 - 15**:*

9. Cause of Hearing loss	☐ ☐ Congenital / Acquired
10. Onset of hearing loss	☐ ☐ ☐ Since birth / Childhood/ Adulthood
11. Level of hearing loss	_____dB
12. Do you seek medical treatment?	☐ Yes/ ☐ No
13. Do you use hearing aids?	☐ Yes / ☐ No

14. Are you familiar with Sign language?	☐ Yes/ ☐ No
15. Who is your Caretaker?	☐ Parents / ☐ Relatives / ☐ Institution

APPENDIX – II

DEMOGRAPHIC PROFILE (MIZO VERSION)

*Mizoram University ah research ti lai mek ka ni a, he research atan hian a hnuaia zawhna te hi khawngaiha min chhan sak turin ka ngen a che. I hming ziah lan a ngai lova, i chhanna te hi **Confidential** a ni a, zirna atan chauha hman tur a ni. Chhana dik leh diklo a awm lova, I chhanna te hi zirchianna atana hman rem i ti anih chuan i nihna ang chiaha uluk tak leh kimchang taka min chhansak turin ka ngen a che. Ka lawm e.*

1. Kum:	_____ years
2. Gender:	☐ Mipa / ☐ Hmeichhia
3. Lehkha zir san zawng:	☐ School kallo / ☐ Below Matric / ☐ Class 10 / ☐ Class 12 / ☐ Graduate / ☐ Post-Graduate
4. Nupui/Pasal:	☐ Neilo / ☐ Nei / ☐ Inthen tawh
5. Hna:	☐ Nei / ☐ Neilo
6. Thla khata chhungkaw sum lakluh zat:	☐ Below 25000/ ☐ 25000-75000/ ☐ Above 75000
7. Veng leh Khua:	
8. I ri hriatna a tha em?	☐ Tha / ☐ Thalo

*I ri hriatna **a thatloh chuan** a hnuaia **Sl. 9 - 15** te hi khawngaihin chhang chhunzawm rawh le:*

9. Ri hriatna thatloh chhan?	☐ ☐ Pian tirh ata thalo / Accident
10. Engtik atangin nge i ri hriatna a thalo tih in hriat chhuah?	☐ ☐ ☐ Piantirh ata / Naupan lain/ Puitlin hnuah
11. Eng level a thalo nge?	_____dB
12. Treatment I la em?	☐ Aw/ ☐ Aih

13. Beng dar I vuah em?	☐ Aw / ☐ Aih
14. Sign language zirna school atangin I zir em?	☐ Zir / ☐ Zirlo
15. Tunge enkawl che? (Caretaker)	☐ ☐ ☐ Nu leh Pa / Chhungte dang / Institution

APPENDIX – III

GENERAL HEALTH QUESTIONNAIRE – 28

(GHQ – 28; Goldberg, 1978)

A hnuaia zawhnate hi nangmah i inhriatna angin a hnuaia chhanna pali zinga i rilru mil ber hian i chhang dawn nia:

1 = Not at all **2 = Rarely sometimes** **3 = Often** **4 = Always**

Have you recently…				
1. Been feeling perfectly well and in good health?	1	2	3	4
2. Been feeling in need of a good tonic?	1	2	3	4
3. Been feeling run down and out of sorts?	1	2	3	4
4. Felt that you are ill?	1	2	3	4
5. Been getting any pains in your head?	1	2	3	4
6. Been getting a feeling of tightness or pressure in your head?	1	2	3	4
7. Been having hot or cold spells?	1	2	3	4
8. Lost much sleep over worry?	1	2	3	4
9. Had difficulty in staying asleep once you are off?	1	2	3	4
10. Felt constantly under strain?	1	2	3	4

11. Been getting edgy and bad-tempered?	1	2	3	4
12. Been getting scared or panicky for no good reason?	1	2	3	4
13. Found everything getting on top of you?	1	2	3	4
14. Been feeling nervous and strung-up all the time?	1	2	3	4
15. Been managing to keep yourself busy and occupied?	1	2	3	4
16. Been taking longer over the things you do?	1	2	3	4
17. Felt on the whole you were doing things well?	1	2	3	4
18. Been satisfied with the way you've carried out your task?	1	2	3	4
19. Felt that you are playing a useful part in things?	1	2	3	4
20. Felt capable of making decisions about things?	1	2	3	4
21. Been able to enjoy your normal day-to-day activities?	1	2	3	4
22. Been thinking of yourself as a worthless person?	1	2	3	4
23. Felt that life is entirely hopeless?	1	2	3	4
24. Felt that life isn't worth living?	1	2	3	4
25. Thought of the possibility that you might make away with yourself?	1	2	3	4
26. Found at times you couldn't do anything because your nerves were too bad?	1	2	3	4
27. Found yourself wishing you were dead and away from it all?	1	2	3	4
28. Found that the idea of taking your own life kept coming into your mind?	1	2	3	4

APPENDIX – IV

GENERAL HEALTH QUESTIONNAIRE – 28 (MIZO VERSION)

(GHQ – 28; Goldberg, 1978)

A hnuaia zawhnate hi nangmah i inhriatna angin a hnuaia chhanna pali zinga i rilru mil ber hian i chhang dawn nia:

1 = Ni Ngailo **2 = Ni vak lo** **3 = Ni ve tho** **4 = Ni lutuk**

Heng zawhnate hi han chhang teh le	**Chhanna tur**			
1. Hrisel tak niin i in hria em?	1	2	3	4
2. Damdawi tha tak mamawhin I in hria em?	1	2	3	4
3. Chau chhia in i in hria em?	1	2	3	4
4. Damlo niin i in hria em?	1	2	3	4
5. I lu a na thin em?	1	2	3	4
6. Tawt riau in i in ngai em?	1	2	3	4
7. I thinur emaw titau thin em?	1	2	3	4
8. Mangan avangin i mu theilo thin em?	1	2	3	4
9. Mut theihloh i nei thin em?	1	2	3	4
10. Ritphurh nei rengin i in hria em?	1	2	3	4
11. I thin a chhia em?	1	2	3	4
12. Chhan awmloin I buaichuai/thlabar thin em?	1	2	3	4
13. Thil engkim hi huphurhawm niin i hre thin em?	1	2	3	4

14. Hlauthawng leh tang mar deuh in i awm thin em?	1	2	3	4
15. Rilru la turin eng eng emaw i ti thin em?	1	2	3	4
16. Thiltih mai i harsat thin em?	1	2	3	4
17. I thiltih hi tha taka tiin i in hre thin em?	1	2	3	4
18. I thiltih tawh chung ah te i lungawi thin em?	1	2	3	4
19. Thil tangkai tak tiin i in hre thin em?	1	2	3	4
20. Remhre takin thil i ti thin niin I inhria em?	1	2	3	4
21. Nitin a i thiltih thin te nuam i ti thin em?	1	2	3	4
22. Mi tangkailo tak niin i in hre thin em?	1	2	3	4
23. Damchhung hian engmah beisei tur awmlo in i hre thin em?	1	2	3	4
24. Damchhan awmlo in i hre thin em?	1	2	3	4
25. Engtin emaw tal I tana kawng tha zawk awmin I ring thin em?	1	2	3	4
26. Hlauhthawn neih vangin thil tih hleihtheihloh chang I nei thin em?	1	2	3	4
27. Thih daih a, khawvel chhuahsan daih duh chang i nei em?	1	2	3	4
28. Mahni nunna lak mai chakna hi i rilru ah a lo lut ngai em?	1	2	3	4

APPENDIX – V

MENTAL HEALTH CONTINUUM – SHORT FORM

(MHC – SF; Keyes, 2005)

Please answer the following questions are about how you have been feeling during the past month. Place a check mark in the box that best represents how often you have experienced or felt the following:

During the past month, how often did you feel …	NEVER	ONCE OR TWICE	ABOUT ONCE A WEEK	ABOUT 2 OR 3 TIMES A WEEK	ALMOST EVERY DAY	EVERY DAY
1. Happy	1	2	3	4	5	6
2. Interested in life	1	2	3	4	5	6
3. Satisfied with life	1	2	3	4	5	6
4. That you had something important to contribute to society	1	2	3	4	5	6
5. That you belonged to a community (like a social group, or your neighborhood)	1	2	3	4	5	6
6. That our society is a good place, or is becoming a better place, for all people	1	2	3	4	5	6
7. That people are basically good	1	2	3	4	5	6
8. That the way our society works makes sense to you	1	2	3	4	5	6
9. That you liked most parts of your personality	1	2	3	4	5	6
10. Good at managing the responsibilities of your daily life	1	2	3	4	5	6
11. That you had warm and trusting relationships with others	1	2	3	4	5	6
12. That you had experiences that challenged you to grow and become a better person	1	2	3	4	5	6
13. Confident to think or express your own ideas and opinions	1	2	3	4	5	6
14. That your life has a sense of direction or meaning to it	1	2	3	4	5	6

APPENDIX – VI

MENTAL HEALTH CONTINUUM – SHORT FORM (MIZO VERSION)

(MHC – SF; Keyes, 2005)

Thla liam ta ah khan heng a hnuai ami ang hian i awm thin em? I awm ngun dan a zirin a zawnah thai rawh le:

Thla liamta khan a hnuaia ang hian engtianga zing in nge i awm thin?	**Awm ngailo**	**Vawi hnih khat**	**Kar khatah vawi khat**	**Kaar khatah vawi 2/3**	**Nitin deuh thaw**	**Nitin**
1. Ka hlim thin	1	2	3	4	5	6
2. Hringnun hi nuam ka ti	1	2	3	4	5	6
3. Ka hringnunah hian ka lung a awi	1	2	3	4	5	6
4. Khawtlang tan hian tangkaina ka nei	1	2	3	4	5	6
5. Khawtlang leh thenawm khawvengah hian ka tlangnel	1	2	3	4	5	6
6. Kan khawtlang hi mitin tan hmun tha tak a ni. That lam a pan zel a ni	1	2	3	4	5	6
7. Mi hi an tha ka ti	1	2	3	4	5	6
8. Kan khawtlang kalphung hi ka rilrem zawng tak a ni	1	2	3	4	5	6
9. Ka nungchang leh nihphung hi ka duhthusam a ni	1	2	3	4	5	6
10. Ka nitin mawhphurhna hi tha takin ka hlen chhuak thei	1	2	3	4	5	6
11. Midangte nen inlaichinna tha tak ka nei	1	2	3	4	5	6
12. Ka tawnhriatte hian tun aia tha zawk turin hma min sawn tir	1	2	3	4	5	6
13. Ka ngaihtuahna leh ngaihdan te hi huaisen takin ka sawichhuak ngam.	1	2	3	4	5	6
14. Ka hringnun hian awmzia a nei a ni	1	2	3	4	5	6

APPENDIX – VII

RAVEN'S STANDARD PROGRESSIVE MATRICES

(RSPM; Raven et al.,1992)

RESPONSE SHEET

Fill in your correct responses in the following corresponding spaces provided:

Heng a hnuaia a question number zawnah zel hian i chhanna number kha ziak rawh le:

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12

B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12

D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12

E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12

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- National Seminar on "Contemporary Psychosocial Issues – II" organised by Mizoram University Psychology Alumni Association in collaboration with Department of Psychology, Mizoram University on the 30th November, 2019 at Govt. Hrangbana College Aizawl.

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RESEARCH PUBLICATION

- Chhangte, L., & Prof. Zokaitluangi. (2021). Social Dysfunction among the Hearing Impaired in Mizoram. *INSPA Journal of Applied and School Psychology, 2(2),* 61-66.
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ABSTRACT

MENTAL HEALTH FACTORS AND INTELLIGENCE AMONG DEAF AND HARD OF HEARING INDIVIDUALS

AN ABSTRACT SUBMITTED IN PARTIAL FULFILLMENT OF
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DEPARTMENT OF PSYCHOLOGY

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ABSTRACT

MENTAL HEALTH FACTORS AND INTELLIGENCE AMONG DEAF AND HARD OF HEARING INDIVIDUALS

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Submitted

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Mental health is an important and necessary part of health and wellbeing, and is not the mere absence of mental illness. Several factors including biological, psychological and social factors may determine the level of mental health and the prevention of mental disorders. Individual or personal attributes such as the ability to manage one's emotions, thoughts, behaviours and interactions with others are not the only determinants of mental health but also include social, economic, cultural, political and environmental factors such as national policies, social protection, living standards, working conditions and family and community social support (WHO, 2020).

Individuals who are deaf and hard of hearing (DHH) have a higher prevalence of mental health problems however the availability of mental health services for the deaf and hard of hearing is still very poor. They are isolated from the hearing world due to communication barriers and social factors. Many research studies revealed high prevalence of mental health disorder among the deaf populations across several countries (Fellinger, Holzinger & Pollard, 2012; Van Gent, Goedhart, Hindley & Treffers, 2007). Studies suggested that almost half of the deaf population have mental health problem during their lifetime (Fellinger, Holzinger, Sattel, Laucht & Goldberg, 2009).

According to WHO (2020), over 5% of the world's population, i.e. 466 million people, has disabling hearing loss comprising of 432 million adults and 34 million children. By 2050, WHO estimated that one in every ten people i.e. over 900 million people will have disabling hearing loss. WHO defined disabling hearing loss as hearing loss that is greater than 40 decibels (dB) in the better hearing ear in adults and a hearing loss greater than 30 dB in the better hearing ear in children (WHO, 2018).

Several factors contributed towards the high prevalence of mental health problems in the deaf population. Some causal factors of deafness, whether acquired or congenital, may lead to changes in brain development that makes an individual more vulnerable to mental health problems (Brown, Cohen, Greenwald & Susser, 2000; Middleton, Emery & Turner, 2010; Morton & Nance, 2006).

The present study tried to highlight and compare the level of mental health and wellbeing faced by deaf and hard of hearing individuals in Mizoram, India and also compared the level of intelligence of the Deaf and Hard of Hearing (DHH) individuals with the hearing individuals in the adult population.

Most DHH individuals between 21 and 50 years of age have unhealthy beliefs towards their diagnosis and are oblivious of the long-term implications of untreated hearing loss (Hunter, 2018; Idstad, Tambs, Aarhus, & Engdahl, 2019). Young and middle-aged DHH individuals often face stigma due to social perceptions that hearing loss primarily affects only the elderly (Baldridge & Kulkarni, 2017). This illustrates the relevance of study that explores hearing loss in young and middle-aged adults. Mental health and wellbeing and social interaction are some of the psychological mechanisms that can explain dysfunctional behaviors and negative consequences of hearing loss in young and middle-aged adults. The life-course outlook reveals how the demands of society affect our progress of education, family life, and employment during our lives (Newman & Newman, 2016).

Hearing impairment has had numerous implications for psychological, emotional and social well-being and has also influenced social interaction (Lucas, Katiri and Kitterick, 2017). Lawrence and his colleagues (2019) highlighted that there is a correlation among adults between hearing loss and certain mental health effects. Hearing difficulties cause speech problems, which make social communication uncomfortable, leading to isolation from social obligations and thus a sense of alienation and depression (Strawbridge et al., 2000; Weinstein & Ventry, 1982). Impaired communication consequently resulted in limited involvement in group interactions, diminished social role fulfillment satisfaction and social network management concerns (Kramer et al., 2002; van Groenou, Hoogendijk, & van Tilburg, 2013). Many clinical findings have found that impaired functional hearing is related to poor mental health as factors such as depression and emotional disturbance are taken into account (Gopinath et al., 2012; Kramer, Kapteyn, Kuik, & Deeg, 2002; Saito et al., 2010). Chia et al. (2007) found that hearing loss was related to lower social success levels. For the general well-being of older hearing-impaired people, social interactions are also essential, but this demographic may embrace their hearing loss more by associating it with being a normal part of the aging process (Nachtegaal, Festen, & Kramer, 2012; Tambs, 2004) and therefore the effects of having communication difficulties. Low psychosocial wellbeing results after hearing damage tend to stem from an inability to learn or deal adequately with hearing loss and its impact on everyday lives and social life (Andersson, Melin, Lindberg, & Scott, 1996).

Studies have found that untreated hearing loss can result in social exclusion, cognitive impairment, feelings of incompetence, and higher levels of occupational depression in individuals between the ages of 13 and 70 (Baldridge & Kulkarni, 2017; Dawes et al., 2015; Stevenson et al., 2017).

Several research that addressed the prevalence of anxiety in individuals diagnosed with hearing loss have found an elevated risk of depression (Abbas et al. 2019; Eleuteri et al., 2010; Knutson, Johnson, & Murray, 2006; Kobosko et al., 2018). Other forms of psychological disorder, such as depression and frustration, may arise from acquired hearing loss and perceived impairment. Adults aged 50 or over with an impairment are also found to be more likely to suffer depression on a daily or weekly basis by Xiang et al. (2020). People experiencing hearing loss often feel isolated, which also leads to poorer mental health (Dawes et al., 2015; Heffernan et al., 2019). Hearing loss and deafness are isolated in nature, and a study of 2,300 adults aged 50 or older with hearing loss struggled to engage in social activities (Reinemer & Hood, 1999). A study of 178 individuals with hearing loss between the ages of 17 and 84 found increased levels of social introversion and loneliness (Knutson et al., 2006). In addition, the research examined the effect of hearing loss on social isolation characteristics (Heffernan et al., 2019).

The relevance of intelligence testing can be attributed to the fact that in deaf individuals, the literature indicates connections between communication, adaptive behaviour, functional outcome and cognition. Huber and Kipman (2012) tested children with cochlear implants and normal-hearing peers paired by age and sex and revealed that cognitive ability were shown to associate substantially with academic achievement, suggesting that cognitive output is associated to good learning and acquisition of academic abilities in natural hearing, as well as in children with cochlear implants.

Psychological assessments focused on the use of verbal language to assess intelligence are inadequate because language deficits are measured rather than intelligence deficiencies (Myklebust, 1954; Vernon, 1976). Instead, nonverbal performance assessments provide this demographic with the most valid intelligence indicators (Vernon & Brown, 1964). Vernon (1968) stated the lack of a consistent association between type of hearing loss and Level of intelligence, degree of hearing

loss and IQ, or age of onset of deafness and IQ in a study of 50 years of studies on intelligence of the hearing impaired. The correlation between scores on the Leiter International Performance Scale and subsequent school achievement was investigated by Birch, Stuckless, and Birth (1963) and found an important, positive connection between the two. But using separate studies, Brill (1962) tested the same relationship and found that the distribution for the hearing impaired was close to that of the hearing subjects. Furth (1966) and Darbyshire (1965) tested hearing-impaired people on Piagetian tasks using two separate methods. Findings from both studies found that, with ample time to complete tasks, the hearing impaired were not inferior to the hearing subjects.

The present study entitled *"Mental Health Factors and Intelligence among Deaf and Hard of Hearing Individuals"* aimed to study the prevalence and level of mental health conditions and cognitive ability among the hearing impaired in the Mizo population. The study focused on some of the factors of mental health such as emotional, social and psychological wellbeing; on the mental health problems such as somatic symptoms, anxiety/ insomnia, social dysfunction and severe depression; and on cognitive ability comparing their prevalence between the Deaf and Hard of Hearing (DHH) and normal hearing individuals; and to determine the independent effects and interaction effect of 'hearing ability, 'gender' and 'age group' on Emotional Well-being, Social Well-being, Psychological Well-being, Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, Severe Depression and Intelligence among the target population.

It was hypothesised that the level of mental well-being being (Emotional Well-being, Social Well-being, Psychological Well-being) among DHH individuals would be significantly lower, whereas mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression) among DHH individuals would be significantly higher when compared to normal hearing and that normal-hearing individuals would perform significantly higher than DHH individuals on cognitive abilities (Intelligence). It was also predicted that mental well-being (Emotional Well-being, Social Well-being, Psychological Well-being) would be significantly higher for males than females and vice versa for mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression); males will perform significantly higher on cognitive abilities (Intelligence) than

females. It was expected that Young adults will have significantly higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults but significantly lower levels of emotional, social and psychological wellbeing and intelligence. It was also hypothesised that 'hearing ability, 'gender' and 'age group' would have a significant independent effect and significant interaction effect on Emotional Well-being, Social Well-being, Psychological Well-being, Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, Severe Depression and Intelligence in the target population. Cognitive abilities were projected to predict the level of Emotional Well-being, Social Well-being, Psychological Well-being, Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, Severe Depression and Intelligence.

To achieve the objectives and hypothesis of the study, three hundred and twenty (320) participants from different parts of Mizoram, a state in the northeast of India, comprising 160 DHH {80 females (40 young adults and 40 Middle adults) and 80 males (40 young adult and 40 middle adults)} and 160 Normal hearing {80 females (40 young adult and 40 middle adults) and 80 males (40 young adult and 40 middle adults)} of the age group 20 to 39 years (Young Adult) and 40 to 59 years (Middle Adult) were selected to serve as samples by employing multistage sampling procedure. The age range was 20-59 years which was classified into two age groups Young Adult (20-39 years) and Middle Adult (40-59 years) following the stages of psychosocial development proposed by Erikson (Erikson, 1950).

The design of the study was a 2 x 2 x 2 factorial design (2 Hearing abilities x 2 Gender x 2 Age groups). The samples were categorised into eight comparison groups, each group containing 40 subjects in each eights groups: DHH Female Young Adult (DHFYA), DHH Female Middle Adult (DHFMA), DHH Male Young Adult (DHMYA), DHH Male Middle Adult (DHMMA), Normal Hearing Female Young Adult (NHFYA), Normal Hearing Female Middle Adult (NHFMA), Normal Hearing Male Young Adult (NHMYA) and Normal Hearing Male Middle Adult (NHMMA).

The Mental Health Continuum – Short Form (MHC – SF; Keyes, 2005), General Health Questionnaire – 28 (GHQ – 28; Goldberg, 1978) and Raven's Standard Progressive Matrices (SPM; Raven et al, 1992) were employed for psychological

evaluation of the samples, all prescribed instructions are given in the manuals and APA guidelines for research were followed.

Sample Characteristics

The sample was categorised based on their hearing abilities consisting of 160 DHH and 160 Normal hearing individuals. Each of these two groups consisted of 80 males and 80 females which are again equally categorised based on their age group into Young Adults and Middle Adults as seen in Figures 2 to 4. The whole sample is distributed into eight equal comparison groups viz. DHH Female Young Adult (DHFYA), DHH Female Middle Adult (DHFMA), DHH Male Young Adult (DHMYA), DHH Male Middle Adult (DHMMA), Normal Hearing Female Young Adult (NHFYA), Normal Hearing Female Middle Adult (NHFMA), Normal Hearing Male Young Adult (NHMYA) and Normal Hearing Male Middle Adult (NHMMA), each group containing 40 subjects.

Subject-wise scores on items of the Mental Health Continuum – Short Form (MHC – SF; Keyes, 20005), General Health Questionnaire – 28 (GHQ – 28; Goldberg, 1978) and Raven's Standard Progressive Matrices (SPM; Raven et al, 1992) were prepared for the whole samples - DHH Female Young Adult (DHFYA), DHH Female Middle Adult (DHFMA), DHH Male Young Adult (DHMYA), DHH Male Middle Adult (DHMMA), Normal Hearing Female Young Adult (NHFYA), Normal Hearing Female Middle Adult (NHFMA), Normal Hearing Male Young Adult (NHMYA) and Normal Hearing Male Middle Adult (NHMMA).

Results Analysis of the present study was done in a phased manner:

1) Checking of missing raw data and outliers,
2) Psychometric adequacy of the Psychological scales – Reliability and Homogeneity,
3) Descriptive statistics,
4) Relationship between the behavioural measures.
5) Prediction – ANOVA and Regression.

1) Checking of missing raw data and outlier

The raw data set was checked for missing raw data and extreme outliers. Since there were no missing data or extreme outliers, further analysis was carried on.

2) Psychometric adequacy of the Psychological scales

Psychometric analyses of the scales and subscales were done by employing Microsoft Office Excel 2013 and IBM's Statistical Package for the Social Sciences (SPSS 26). The psychological scales used in the present study were originally constructed for a different culture. Thus, it is essential to check that the scales are appropriate for the present study to verify the trustworthiness of the scales for the population under study.

The reliabilities of all the subscales i.e., (i) Somatic Symptoms, (ii) Anxiety/insomnia, (iii) Social Dysfunction, (iv) Severe Depression, (v) Emotional Well-being, (vi) Social Well-being, and (vii) Psychological Well-being in the present study were calculated using Cronbach's Alpha. Table-1 shows the reliability for the four subscales of GHQ-28 i.e., somatic symptoms, anxiety/insomnia, social dysfunction and severe depression subscales; and three subscales of MHC-SF i.e., emotional well-being, social well-being and psychological well-being subscales.

The internal consistency of the scales was calculated using Cronbach's Alpha and all the scales and subscales were found to be highly reliable (Table 1). The Somatic Symptom subscale consists of 7 items (α = .84), the Anxiety/Insomnia subscale consists of 7 items (α = .91), the Social Dysfunction subscale consists of 7 items (α = .89) and the Severe Depression subscale consists of 7 items (α = .82) of the GHQ-28 appeared to have good internal consistency. Cronbach's alphas for the 3 Emotional Wellbeing, 5 Social Wellbeing and 6 Psychological Wellbeing items of the MHC-SF Scale were .87, .83 and .87 respectively. Cronbach's Alpha for the RSPM scale was .73.

Levene's Test of Equality of variances and Browne Forsythe tests were employed for the assumptions of homogeneity of variances. Levene's test examined whether the variances of the samples under study are approximately equal. Table 1 shows that the significances of Levene's Test of Equality of variances for each of the subscales or scales under study are greater than .05, which is non-significant. This

indicated that the assumptions of homogeneity of variance have been met. Brown-Forsythe Robust tests (for equality of means) are all statistically significant for all the scales and subscales as their p-values are less than 0.05. Thus, further statistical analyses can be continued as the results indicated the appropriateness of the scales/ subscales.

3) Descriptive Statistics (Mean, SD, Skewness, Kurtosis)

The descriptive statistics of the raw data consisting of the Mean, Standard Deviation, Skewness and Kurtosis are indices for normality of the scores of the population under study on the measured variables. To test the assumption of normality, skewness and kurtosis were analysed. The results showed that the samples are normally distributed.

The mean score on Somatic symptoms variables indicated that the mean scores of DHH Female Young adults were highest (M = 20.33, SD = .99) whereas that of Normal Hearing Female Middle adults was the lowest (M = 11.93, SD =1.14). The mean score on Anxiety/Insomnia variables also indicated that the mean scores of DHH Female Young adults were highest (M = 20.93, SD = 2.24) whereas that of Normal Hearing Female Middle adults was the lowest (M = 9.67, SD =1.42). The mean score of DHH Female Young adult (M = 26.13, SD = 1.72) on Social Dysfunction variables was the highest among the group while that of Normal Hearing Male Middle Adult (M = 16.47, SD = 2.10) was the lowest. The mean score of DHH Female Young Adult was highest (M = 19.00, SD = 2.05) whereas that of Normal Hearing Male Middle Adult was lowest (M = 12.43, SD = 3.58). Compared to the previous variables, the mean score reversed in the case of Emotional Wellbeing variables where Normal Hearing Male Middle Adult's mean score was highest (M = 15.47, SD = 2.24) and the lowest score was that of DHH Female Young Adult (M = 8.27, SD = 3.00). The highest mean score was that of Normal Hearing Male Young Adult (M = 22.93, SD = 3.36) and the lowest was that of DHH Female Young Adult (M = 15.77, SD = 3.15) on Social Wellbeing variables. Normal Hearing Male Middle Adult has the highest mean score of 31.90 (SD = 2.22) on Psychological Wellbeing variables whereas DHH Female Young Adult (M = 20.37, SD = 2.47) scored the lowest. The mean score on Intelligence showed that Normal Hearing Male Middle Adult (M = 44.37, SD = 5.01)

has the highest score whereas DHH Female Young Adult (*M*= 16.90, *SD* = 2.55) scored the lowest.

Considering the whole sample, the mean scores on the dependent variables were 17.17 (SD = 3.24) for Somatic Symptoms variables, 15.85 (SD = 3.95) for Anxiety/Insomnia variables, 20.55 (SD = 3.67) for Social Dysfunction variables, 15.12 (SD = 3.78) for Severe Depression, 11.95 (SD = 3.07) for Emotional Wellbeing variables, 21.13 (SD = 4.27) for Social Wellbeing variables, 26.82 (SD = 4.27) for Psychological Wellbeing variables and 31.23 (SD = 9.50) for Intelligence variables.

Individuals with hearing impairment scored higher than the Normal Hearing individuals on Somatic Symptoms, Anxiety / Insomnia, Social Dysfunction and Severe Depression variables whereas scores of Normal Hearing Individuals were higher than the DHH on Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence variables. Gender wise, the scores of Females were higher on Somatic Symptoms, Anxiety / Insomnia, Social Dysfunction and Severe Depression while males scored higher on Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence variables. In terms of Age group, the Young Adult scored higher than the Middle Adult on Somatic Symptoms, Anxiety / Insomnia, Social Dysfunction and Severe Depression while Middle Adult scored higher on Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence variables.

Results suggested that DHH individuals seem to have a higher level of mental health problems than normal hearing individuals. The scores on anxiety, depression, social dysfunction and somatic symptoms were higher for individuals with hearing loss. These results corresponded to the findings of the previous researcher that the prevalence of mental health problems was higher in individuals with hearing loss (Abbas et al., 2019; Istad et al., 2019; Clarke et al., 2019). Clarke and his colleagues (2019) suggested that hearing loss leads to anxiety that impacted sleeping habits, stress, social isolation and depression. Several pieces of research linked hearing loss with the prevalence of anxiety and elevated risk of depression (Abbas et al. 2019; Eleuteri et al., 2010; Knutson, Johnson, & Murray, 2006; Kobosko et al., 2018). Previous studies had also linked social isolation with hearing loss which led to poor mental health (Baldridge & Kulkarni, 2017; Dawes et al., 2015; Heffernan et al., 2019;

Stevenson et al., 2017). Knutson and friends (2006) found increased levels of social introversion and loneliness in DHH individuals.

The present study had also shown that the emotional, social and psychological wellbeing of the DHH individuals were lower when compared to hearing individuals. These findings are commensurate with previous research findings that implicate emotional, social and psychological wellbeing with hearing impairment (Lucas, Katiri and Kitterick, 2017). Hearing loss not only affected the relationship and social exclusion but also lowered self-esteem, which consequently affected mental health and wellbeing (Fellinger et al., 2009; Ridgeway, 1997). The results of the present study also suggested that normal-hearing individuals performed better in an intelligence test when compared with DHH individuals. This finding was in congruence with the findings of the previous intelligence research which found lower intelligence performances of the DHH individuals (Huber and Kipman, 2012; Myklebust, 1960; Pronovost et al., 1976).

These findings confirmed the first, second and third hypotheses set forth for the study that the level of mental well-being (Emotional Well-being, Social Well-being, Psychological Well-being) among DHH individuals would be significantly lower, whereas mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression) among DHH individuals would be significantly higher when compared to normal hearing and that normal-hearing individuals would perform significantly higher than DHH individuals on cognitive abilities (Intelligence).

It was found in the present study that females had higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression when compared to males and vice-versa on emotional, social and psychological wellbeing and intelligence. Previous studies suggested that women suffered more mental health such as anxiety and depression than their male counterparts (Copeland et al., 1999; Sonnenberg, Beekman, Deeg, & van Tilburg, 2000; Zunzunegui, Alvarado, Béland, & Vissandjee, 2009). Sonnenberg and colleagues (2000) had shown that the prevalence of depression was doubled in women when compared to men in the adult population. This confirmed the fourth hypothesis set forth for the study that mental well-being (Emotional Well-being, Social Well-being, Psychological Well-being) would be

significantly higher for males than females and vice versa for mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression); males will perform significantly higher on cognitive abilities (Intelligence) than females.

The results of the present study revealed that young adults had higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults and vice-versa on emotional, social and psychological wellbeing and intelligence. This proves the fifth hypothesis that Young adults will have significantly higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults but significantly lower levels of emotional, social and psychological wellbeing and intelligence. However, the finding of the present study is in contrast with the previous findings of McCrone and colleagues (2008) which reported that older people were more prone to suffer from depression, social dysfunction and declining physical health. Older adults were found to be more likely to experience insomnia (Jean-Louis, et al., 2001; Klink, et al., 1992; Ohayon, 1996).

4) Relationship between the Behavioural measures

Bivariate correlation (Pearson Correlation) was employed to determine the significant relationship between the dependent variables. Results of the Pearson correlation revealed significant correlations among the dependent variables.

Somatic Symptoms had a significant positive relationship with Anxiety / Insomnia (r = .82, p < .01), Social Dysfunction (r = .69, p < .01), Severe Depression (r = .56, p < .01) and a significant negative relationship with Emotional Wellbeing (r = -.66, p < .01), Social Wellbeing (r = -.40, p < .01), Psychological Wellbeing (r = -.79, p < .01) and Intelligence (r = -.86, p < .01).

Anxiety / Insomnia had a significant positive correlation with Social Dysfunction (r = .624, p < .01), Severe Depression (r = .512, p < .01) and a significant negative correlation with Emotional Wellbeing (r = -.64, p < .01), Social Wellbeing (r = -.39, p < .01), Psychological Wellbeing (r = -.77, p < .01) and Intelligence (r = -.81, p < .01).

Social Dysfunction had a significant positive correlation with Severe Depression (r = .41, p < .01) and significant negative relationship with Emotional

Wellbeing (r = -.51, p < .01), Social Wellbeing (r = -.34, p < .01), Psychological Wellbeing (r = -.62, p < .01) and Intelligence (r = -.657, p < .01).

Significant negative correlations were found between Severe Depression and Emotional Wellbeing (r = -.498, p < .01), Social Wellbeing (r = -.291, p < .01), Psychological Wellbeing (r = -.54, p < .01) and Intelligence (r = -.53, p < .01).

There was a significant positive relationship between Emotional Wellbeing and Social Wellbeing (r = .36, p < .01), Psychological Wellbeing (r = .63, p < .01) and Intelligence (r = .65, p < .01).

Significant positive correlation was also found between Social Wellbeing and Psychological Wellbeing (r = .42, p < .01) and with Intelligence (r = .41, p < .01). There was a significant positive relation between Psychological Wellbeing and Intelligence (r = .79, p < .01).

Highest significant positive correlation was found between Somatic Symptoms and Anxiety / Insomnia (r = .82, p < .01) whereas the highest significant negative correlation was found between Somatic Symptoms and Intelligence (r = -.86, p < .01).

Literature suggested that the relationship between mental health and social factors is bidirectional, and vice versa (Bährer-Kohler, 2012). Previous studies attributed depression to chronic health problems, decreased physical activities, social isolation and decreased family interactions (Grundy et al., 2013). A study by Grundy and colleagues (2013) linked social isolation in the elderly to poor mental health such as depression, suicidal ideation, and even death. Cognitive and physical impairments, social isolation, depression and stress are contributing factors to anxiety (Vink et al., 2008). Depression in older people impacted physical wellbeing and quality of life (Fiske et al., 2009). Chu and colleagues (2016) correlated insomnia with loneliness.

Spearman correlation was calculated to examine the relationship of demographics such as Hearing Abilities, Gender and Age Group with dependent variables. The result as shown in Table 5 indicated that there were several significant relationships among them.

Hearing Abilities had a significant negative correlation with Somatic Symptoms (r = -.82, p < .01), Anxiety / Insomnia (r = -.79, p < .01), Social Dysfunction (r = -.47, p < .01) and Severe Depression (r = -.53, p < .01) and a

significant positive relationship with Emotional Wellbeing (r = .59, p < .01), Social Wellbeing (r = .37, p < .01), Psychological Wellbeing (r = .72, p < .01).

Gender had a significant negative correlation with Somatic Symptoms (r = -.42, p < .01), Anxiety / Insomnia (r = -.36, p < .01), Social Dysfunction (r = -.50, p < .01) and Severe Depression (r = -.22, p < .01) and a significant positive relationship with Emotional Wellbeing (r = .29, p < .01), Social Wellbeing (r = .19, p < .01), Psychological Wellbeing (r = .49, p < .01).

Age had a significant negative correlation with Anxiety / Insomnia (r = -.19, p < .01) and Social Dysfunction (r = -.20, p < .01) and a significant positive relationship with Social Wellbeing (r = -.36, p < .05).

The highest significant positive correlation was found between Hearing Abilities and Psychological Wellbeing (r = .72, p < .01) whereas the highest significant negative correlation was found between Hearing Impairment and Somatic Symptoms (r = -.82, p < .01).

Literature addressed the prevalence of anxiety and depression in DHH individuals (Abbas et al., 2019; Eleuteri et al., 2010; Knutson et al., 2006; Kobosko et al., 2018). Hearing abilities and psychosocial wellbeing were found to be correlated and are influenced by variables such as age, ethnicity and other social factors (Chen, 1994; Ives, Bonino, et al., 1995; Nachtegaal et al., 2009; Pronk et al., 2011). Hawthorne (2008) found young adults were more socially alienated than middle adults. Hearing loss was considerably linked to decreased social functioning by Eleuteri and colleagues (2010) in the adult population. DHH individuals were found to be more vulnerable to physical symptoms associated with anxiety and insomnia (Clarke, Hoare, & Killan, 2019).

(5) Prediction of Independent on Dependent Variables (ANOVA, Post hoc mean comparision, Regression)

Analysis of variance indicated the significant independent effects of the independent variables of ‘Hearing Abilities’, ‘Gender’ and ‘Age Group’ on the dependent variables and also the significant interaction effect of ‘Hearing Abilities x Gender x Age Group’ on the dependent variables for the whole sample.

2x2x2 Factorial ANOVA was employed to examine the independent effects and interaction effects of Hearing Impairment, Gender and Age group on the dependent variables. Hearing Abilities have a significant independent effect with an effect size of 61% on Somatic symptoms, 57 % on Anxiety/Insomnia, 22% on Social Dysfunction and 27% on Severe Depression variables. Gender has a significant independent effect with an effect size of 22% on Somatic symptoms, 16% on Anxiety/Insomnia, 26% on Social Dysfunction and 6% on Severe Depression variables. Age has a significant independent effect with an effect size of only 2% on Somatic symptoms, 5% on anxiety/insomnia and 1% on Social Dysfunction variables.

Significant interaction effects of Hearing Abilities, Gender and Age on the dependent variables were also found. Hearing Abilities and Gender has a significant interaction effect with an effect size of 83%, 74%, 49% and 34% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression respectively. Hearing Abilities and Age has a significant interaction effect with an effect size of 68%, 63%, 33% and 30% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression variables respectively. Gender and Age have a significant interaction effect with an effect size of 78%, 23%, 36% and 9% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression variables respectively. Hearing Abilities, Gender and Age has a significant interaction effect with an effect size of 90%, 81%, 60% and 38% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression respectively.

Hearing Abilities, Gender and Age have significant independent and interaction effects on Emotional Wellbeing, Social Wellbeing and Psychological Wellbeing. Hearing Abilities had a significant independent effect with an effect size of 27% on Emotional Wellbeing, 14% on Social Wellbeing and 48% on Psychological Wellbeing. Gender has a significant independent effect with an effect size of 10% on Emotional Wellbeing, 5% on Social Wellbeing and 24% on Psychological Wellbeing. Age has a significant independent effect with an effect size of 3% on Emotional Wellbeing, 2% on Social Wellbeing and 2% on Psychological Wellbeing.

Hearing Abilities and Gender has a significant interaction effect with an effect size of 45% on Emotional Wellbeing, 24% on Social Wellbeing and 73% on Psychological Wellbeing. Significant interaction effect of Hearing Abilities and Age

was found with an effect size of 40% on Emotional Wellbeing, 16% on Social Wellbeing and 50% on Psychological Wellbeing. A significant interaction effect between Gender and Age was found with an effect size of 16% on Emotional Wellbeing, 10% on Social Wellbeing and 27% on Psychological wellbeing. A significant interaction effect between Hearing Abilities, Gender and Age were found with an effect size of 50% on Emotional Wellbeing, 30% on Social Wellbeing and 76% on Psychological Wellbeing.

The results of the ANOVA proved the seventh and eighth hypotheses set forth for the present study. Hearing ability and Gender had a significant interaction effect on the dependent variables. Hearing abilities and Age Group also had a significant interaction effect on the dependent variables. These findings were in congruence with previous research findings. Tambs (2004) associated hearing abilities with mental health effects, such as anxiety, depression and well-being in adults and found that the mental health factors of young and middle-aged DHH were more positively correlated with hearing loss than among older DHH adults. The probability of DHH individuals showing signs of anxiety and depression was higher than normal hearing individuals (Shoham, et al., 2019). Hearing impairment was found to impact psychological, emotional and social well-being and affected social interaction (Lucas, Katiri and Kitterick, 2017). Poor communication was correlated to poor psychosocial functioning (Black and Glickman 2005). Women were found to suffer more mental health problems such as depression and anxiety when compared to men (Copeland et al., 1999; Sonnenberg et al., 2000; Zunzunegui et al., 2009).

Mean differences between the Comparision Groups (Post Hoc Analysis: Scheffe's Test) on Mental health variables.

The Post-hoc multiple mean comparisons employing Scheffe's test were conducted between DHH Female Young Adult (DHFYA), DHH Female Middle Adult (DHFMA), DHH Male Young Adult (DHMYA), DHH Male Middle Adult (DHMMA), Normal Hearing Female Young Adult (NHFYA), Normal Hearing Female Middle Adult (NHFMA), Normal Hearing Male Young Adult (NHMYA) and Normal Hearing Male Middle Adult (NHMMA) on the dependent variables, which revealed significant mean differences between most of the groups. The highest significant mean difference was found between DHHMYA and DHHMMA (12.27) on Somatic symptoms variables. On the Anxiety/ insomnia, Social Dysfunction,

Severe Depression and Emotional Wellbeing variables, the highest significant mean difference was found between DHHFYA and DHHMMA. The highest significant means difference was found between DHHFYA and NHFMA (-8.03) on Social Wellbeing. On Psychological Wellbeing variables, the highest significance means difference was between DHHFYA and NHMMA (-11.53).

ANOVA (Non-Parametric Test: Kruskal - Wallis H Test) on Intelligence

Since the RSPM scale is a performance test and violated assumptions for parametric tests, a non-parametric test i.e., Kruskal - Wallis H tests was employed to evaluate the differences between the different comparison groups on the intelligence variables. Results of the independent samples Kruskal - Wallis H test are presented in Table – 8.

A Kruskal-Wallis H test showed that there was a statistically significant difference in the level of intelligence between DHH and normal hearing individuals, $\chi^2(1) = 142.285$, $p = .000$, with a mean rank score of 67.07 for DHH individuals and 173.93 for Normal Hearing individuals. The result also revealed a statistically significant difference in the level of intelligence between females and males, $\chi^2(1) = 45.433$, $p = .000$, with a mean rank score of 90.31 for females and 150.69 for males. The result of the Kruskal Wallis H test between Young adults and Middle Adults in the level of intelligence revealed statistically insignificant differences, $\chi^2(1) = 3.422$, $p = .064$, with a mean rank score of 111.79 for Young Adults and 128.38 for Middle Adults.

Statistically significant differences, $\chi^2(3) = 187.908$, $p = .000$ were found in the level of intelligence across the mean rank scores of 38.83 for DHH females, and 95.31 for DHH males, 141.78 for normal hearing females, and 206.08 for normal hearing males. The result also revealed a statistically significant difference in the level of intelligence among DHH females, DHH Male, NH females and NH Male, $\chi^2(3) = 157.617$, $p = .000$, with a mean rank score of 44.31 for DHH females, 89.83 for DHH males, 141.78 for NH females and 183.78 for NH males. The result of the Kruskal Wallis H test across Gender x Age Group in the level of intelligence revealed statistically insignificant differences, $\chi^2(3) = 58.842$, $p = .000$, with a mean rank score of 72.25 for Female Young Adults, 108.37 for Female Middle Adults, 136.13 for Male Young Adults and 165.25 for Male Middle Adults.

The results of the Kruskal-Wallis H Test showed that there was a statistically significant difference in the level of intelligence across Hearing Ability x Gender x Age Group, $\chi^2(1) = 142.285$, $p = .000$, with a mean rank score of 17.45 for DHHFYA, 60.22 for DHHFMA, 71.17 for DHHMYA, 119.45 for DHHMMA, 127.05 for NHFYA, 156.52 for NHFMA, 201.10 for NHMYA and 211.05 for NHMMA.
The mean rank score of NHMMA is the highest (211.05) whereas DHHFYA has the lowest mean rank score (17.45).

Post hoc mean comparision (Mann-Whitney U Test) on Intelligence

Pairwise comparison was done using the Mann-Whitney U test to evaluate the differences between the group samples on the level of Intelligence. The result revealed that the level of intelligence for the Normal Hearing individuals is significantly higher than DHH individuals, $U = 788.5$, $p = .000$. The Mann-Whitney test revealed that the level of intelligence was greater among males than females, $U = 3577$, $p = .000$. There was no significant effect of Age group on the level of intelligence, $U = 6189$, $p = .064$.

(6) Prediction of Behavioural measures (Regression Analysis)

For the prediction of Emotional Wellbeing, Social Wellbeing and Psychological Wellbeing from the behavioural measures of Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression, Multiple regression analyses were employed which attempted to determine the antecedents and the consequences relationship among the behavioural measures of the theoretical construct as envisioned. The multiple regression model with Somatic Symptoms as predictors and Emotional Wellbeing (F=189.93; p<.01), Social Wellbeing (F=45.41; p<.01) and Psychological Wellbeing (F=420.08; p<.01) as the criterion emerged to be statistically significant. The Durbin-Watson statistics revealed that Somatic symptoms as a predictor explained 44% of variances in Emotional Wellbeing, 16% in Social Wellbeing and 64% in Psychological Wellbeing.

The multiple regression model with Anxiety/Insomnia as predictors and Emotional Wellbeing (F=167.51; p<.01), Social Wellbeing (F=43.20; p<.01) and Psychological Wellbeing (F=319.19; p<.01) as the criterion emerged to be statistically significant. The R, R square and the change statistics with Durbin Watson are presented in Table – 10b. The Durbin-Watson statistics revealed that

Anxiety/Insomnia as a predictor explains 41% of variances in Emotional Wellbeing, 15% in Social Wellbeing and 78% in Psychological Wellbeing.

The multiple regression model with Social Dysfunction as predictors and Emotional Wellbeing (F=86.73; p<.01), Social Wellbeing (F=30.92; p<.01) and Psychological Wellbeing (F=153.16; p<.01) as the criterion emerged to be statistically significant. The R, R square and the change statistics with Durbin Watson are presented in Table – 10c. The Durbin-Watson statistics revealed that Social Dysfunction as a predictor explains 27% of variances in Emotional Wellbeing, 12% in Social Wellbeing and 39% in Psychological Wellbeing.

The multiple regression model with Severe Depression as predictors and Emotional Wellbeing (F=78.51; p<.01), Social Wellbeing (F=21.40; p<.01) and Psychological Wellbeing (F=100.84; p<.01) as the criterion emerged to be statistically significant. The R, R square and the change statistics with Durbin Watson are presented in Table – 10d. The Durbin-Watson statistics revealed that Anxiety/Insomnia as a predictor explains 25% of variances in Emotional Wellbeing, 8% in Social Wellbeing and 29% in Psychological Wellbeing.

Multiple regression analysis was also employed to predict somatic symptoms, anxiety/insomnia, social dysfunction, severe depression, emotional well-being, social well-being and psychological well-being with Intelligence as predictors. The multiple regression model (Table 11) with Intelligence as a predictor explains 74% of variances in Somatic Symptoms, 67% in Anxiety/Insomnia, 43% in Social Dysfunction, 29% in Severe Depression, 43% in Emotional Wellbeing, 17% in Social Wellbeing and 62% on Psychological Wellbeing.

These findings proved the final hypothesis that cognitive abilities had significantly predicted the dependent variables of the study i.e. somatic symptoms, anxiety/insomnia, social dysfunction, severe depression, emotional well-being, social well-being and psychological well-being. Literature suggested that deaf people with comorbidities are more susceptible to mental health problems and encountered cognitive and behavioural challenges which decreased their well-being (Hindley, 2005). The research suggested that there is a relationship between speech, adaptive behaviour and intelligence of deaf individuals (Mayberry, 2002; Kushalnagar et al., 2007). Communication difficulties triggered social dysfunction that impaired

emotional wellbeing (Hindley, 2000; 2005; Horne & Pennington, 2010; Brauer et al., 1998) which subsequently led to inadequate understanding of other's emotional states, limited vocabulary and consequential thoughts (Gray, et al., 2003; Hindley, 2005; Remmel, Bettrer & Weinberg, 2003).

The result of the present study has been summarized as follows concerning the theoretical expectation (hypothesis) set forth for the study:

1) The present study showed that the emotional, social and psychological well-being of the DHH individuals was lower when compared to hearing individuals. Results also suggested that DHH individuals seem to have a higher level of mental health problems than normal hearing individuals. The scores on anxiety, depression, social dysfunction and somatic symptoms were higher for individuals with hearing loss. The results of the present study also suggested that normal-hearing individuals performed better in an intelligence test when compared with DHH individuals. These findings confirmed the first, second and third hypotheses set forth for the study that the level of mental well-being (Emotional Well-being, Social Well-being, Psychological Well-being) among DHH individuals would be significantly lower, whereas mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression) among DHH individuals would be significantly higher when compared to normal hearing and that normal-hearing individuals would perform significantly higher than DHH individuals on cognitive abilities (Intelligence).

2) It was found in the present study that females had higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression when compared to males and vice-versa on emotional, social and psychological wellbeing and intelligence. This confirmed the fourth hypothesis set forth for the study that mental well-being (Emotional Well-being, Social Well-being, Psychological Well-being) would be significantly higher for males than females and vice versa for mental problems (Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression); males will perform significantly higher on cognitive abilities (Intelligence) than females.

3) The results of the present study revealed that young adults had higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults and vice-versa on emotional, social and psychological wellbeing and intelligence. This proves the fifth hypothesis that Young adults will have significantly higher levels of somatic symptoms, anxiety/insomnia, social dysfunction and depression than middle adults but significantly lower levels of emotional, social and psychological wellbeing and intelligence.

4) Results of the Pearson correlation revealed significant correlations among the dependent variables. Somatic Symptoms had a significant positive relationship with Anxiety / Insomnia, Social Dysfunction, and Severe Depression and a significant negative relationship with Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence. Anxiety / Insomnia had a significant positive correlation with Social Dysfunction, Severe Depression and a significant negative correlation with Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence. Social Dysfunction had a significant positive correlation with Severe Depression and a significant negative relationship with Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence. Significant negative correlations were found between Severe Depression and Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence. There was a significant positive relationship between Emotional Wellbeing and Social Wellbeing, Psychological Wellbeing and Intelligence. A significant positive correlation was also found between Social Wellbeing and Psychological Wellbeing and Intelligence. There was a significant positive relation between Psychological Wellbeing and Intelligence. The highest significant positive correlation was found between Somatic Symptoms and Anxiety / Insomnia whereas the highest significant negative correlation was found between Somatic Symptoms and Intelligence. The above findings proved hypothesis no. 6 set forth for the study, that there are significant relationships between the dependent variables under study.

5) Hearing Abilities have a significant independent effect with an effect size of 61% on Somatic symptoms, 57 % on Anxiety/Insomnia, 22% on Social Dysfunction, 27% on Severe Depression, 27% on Emotional Wellbeing, 14% on Social Wellbeing, 48% on Psychological Wellbeing and 55% on Intelligence. This finding supported the theoretical expectation (hypothesis) no. 7 that there will be a significant effect of hearing ability (DHH and Normal Hearing) on Mental Health

factors and Intelligence. DHH scored higher on Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression than normal hearing whereas they scored lower on Emotional wellbeing, Social wellbeing, Psychological wellbeing and Intelligence when compared to Normal Hearing individuals.

6) Gender has a significant independent effect with an effect size of 22% on Somatic symptoms, 16% on Anxiety/Insomnia, 26% on Social Dysfunction and 6% on Severe Depression, 10% on Emotional Wellbeing, 5% on Social Wellbeing, 24% on Psychological Wellbeing and 22% on Intelligence. Females scored higher on somatic symptoms, Anxiety/insomnia, Social Dysfunction and Severe Depression than males whereas females scored lower on Emotional wellbeing, Social wellbeing, Psychological wellbeing and Intelligence when compared to males. This finding supported the theoretical expectation no.7 that a significant difference between males and females would be found in Mental Health and Intelligence.

7) Age has a significant independent effect with an effect size of only 2% on Somatic symptoms, 5% on anxiety/insomnia and 1% on Social Dysfunction, 3% on Emotional Wellbeing, 2% on Social Wellbeing, 2% on Psychological Wellbeing and 2% on Intelligence. Young Adults scored higher than the Middle adults on Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression while Middle adults scored higher on Emotional Wellbeing, Social Wellbeing, Psychological Wellbeing and Intelligence variables. This finding is in support of hypothesis no. 7 set forth for the study that there will be a significant difference between Young Adult and Middle Adult in Mental Health factors and Intelligence.

8) Hearing Abilities and Gender has a significant interaction effect with an effect size of 83%, 74%, 49% and 34% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression respectively. Hearing Impairment and Gender also has a significant interaction effect with an effect size of 45% on Emotional Wellbeing, 24% on Social Wellbeing, 73% on Psychological Wellbeing and 78% on Intelligence. This supports hypothesis no.8 set forth for the study.

9) Hearing Abilities and Age has a significant interaction effect with an effect size of 68%, 63%, 33% and 30% on Somatic symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression variables respectively. Significant interaction effect of Hearing Impairment and Age was also found with an effect size of 40% on Emotional Wellbeing, 16% on Social Wellbeing, 50% on Psychological Wellbeing and 62% on Intelligence. Hypothesis no. 8 is supported by these findings.

10) The multiple regression model with Intelligence as a predictor explains 74% of variances in Somatic Symptoms, 67% in Anxiety/Insomnia, 43% in Social Dysfunction, 29% in Severe Depression, 43% in Emotional Wellbeing, 17% in Social Wellbeing and 62% on Psychological Wellbeing, which supported the final hypothesis set forth for the study.

Limitations

The findings of this study have to be seen in the light of some limitations. The first limitation was sample bias or selection bias. Identification of the sample was challenging as there were no institutions or organizations that accurately maintained the list of DHH individuals in the state. This impacted the selection process of the participants for the study which was based on multistage random sampling and inevitably impacted the sample size. Therefore the findings of this study may not be truly representative of the population.

Another limitation is the lack of research in the area of hearing impairment in the state. There was little or no article or literature that is relevant for the understudied population as there was no prior research study in this area in the Mizo population. Thus, all research studies that are cited in this study are from other cultures. However, this study may be an important opportunity to fill the gaps in prior literature and may present the need for further development in this area of study in the state of Mizoram.

Data collection was another challenging area of this study. Although the data collection was done with the help of trained persons in the area of hearing impairment, not all deaf and hard of hearing participants could read or were familiar with Sign language. This led to difficulty in communication and may have impacted their responses which would have affected the results of the study.

Demographic variables such as causes, level, type and onset of hearing loss were initially an area of interest in the present study however were not considered for the study due to insufficient and vague input. Comorbidity of disability was also another area of interest that was not taken into consideration for the study. A study on these aspects would have provided a greater understanding for further intervention in the treatment of the deaf and hard of hearing population.

Suggestions for Future Studies

Taking into consideration the limitations of the present study, identification and maintenance of the accurate list of deaf and hard of hearing populations in the state are required for future studies. Demographic variables such as educational background, type of family, employment status or socioeconomic status may be important variables that should be taken into consideration in future. The causes, type, level and onset of hearing loss may also play important variables in the study.

Correlational or longitudinal studies on risk factors and comorbidities of hearing loss are required for a better understanding of the wellbeing of the deaf and hard of hearing population. Research on extensive clinical psychological studies of the deaf and hard and hearing population would give more insights into the understanding of their mental health problems, as this population needs more intervention of mental health treatment than the normal-hearing population.

Hearing loss individuals had several challenges in accessing mental and physical health care services. More intervention is necessary for the health care services provided for the deaf and hard of hearing individuals, as they are more prone to social isolation due to communication difficulties that led to a misunderstanding of their problems and misdiagnosis in the treatment they received.

The results from this study may shine a light on the application of strategic intervention and psychological treatment of deaf and hard-of-hearing individuals.

Significance of the study

The present study consented to the suggestions of several prior pieces of research that highlighted the prevalence of mental health problems among the deaf and hard of hearing population. This study revealed that the prevalence of mental health problems is higher among deaf and hard of hearing individuals than in the normal hearing population in Mizoram. This is the pioneer study in the field of mental health among the deaf and hard of hearing population in the state of Mizoram, according to the knowledge of the researcher.

Another significance of the present study is the awareness of the presence of mental health problem comorbidities in individuals with hearing loss, and that they are more prone to suffer from mental health conditions. They are also more likely to socially isolate themselves due to communication difficulties, which may lead to more risk factors for mental health problems.

As indicated in the study, individuals with hearing loss have difficulties in access to mental health services as there is no mental health specialist in Mizoram who are expertise in the area of treating hearing loss patients. This led to a misunderstanding of the exact problem and misdiagnosis or over-diagnosis of the problem. The need for mental health specialist who is also expertise in the field of hearing loss is inevitably essential.

The study highlighted the level of intelligence stating that the deaf and hard-of-hearing individuals performed lower than the normal-hearing population. This may apply to solving certain problems in life such that individuals with hearing loss might find it harder to solve certain challenges that might not be very hard for hearing individuals. This proved the need for extending more care and services to the hearing loss population.

The study highlighted the need for mental health intervention in the deaf and hard of hearing population. Although several clinics and hospitals may give services in terms of physical needs, the mental health aspects of these individuals cannot be overruled. This study revealed that they are the ones who suffered more mental health problems and thus, they are the ones who are more in need of mental health care. The researcher believes that this study might bring light in such a way that the mental health problems of the deaf and hard of hearing might be heard.

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