Mental Disorders and Traumatic Experiences in Deaf and Hard of Hearing Adult Psychiatric Outpatients

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The origin of this work dates back to 1976 at Skådalen School for the Deaf, where I worked as a dormitory assistant, and where my interest in sign languages and the lives and culture of deaf children and adults initiated. Going through daily life with the children and teenagers, I realized how their developmental conditions differed from what I had known. Most striking were, on the one hand, the challenges of communication and accessing knowledge and information and, on the other hand, their close-knit peer groups and friendships, which lasted far beyond their school years. This experience became central to my choice of career, and to my whole life. I learned Norwegian sign language through daily interaction with deaf children – the hard way – with practical jokes and countless misunderstandings, real and pretended. I am grateful – all my life and in different parts of the world I have enjoyed being able to communicate with deaf people. In 1983/84 I spent the year as an international intern at Gallaudet University (then College), studying psychology, counseling, education, anthropology and sign language linguistics; it was a gift, and my professional career took off.

I wish to express my gratitude to all those who are now adults and who spent years of their lives in the dorms of Skådalen residential school in the late 1970s and early 1980s. What I learned from our interaction and conversations laid the foundation for my professional life, which has now also resulted in this thesis.

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Summary

Most of the life of individuals with early hearing loss is similar to that of other people, and most people with reduced hearing do not develop mental problems in the course of their life. However, living life without typical hearing may pose additional challenges that may impact on the risk for developing mental disorders. Hearing loss occurs in 1 to 2 per 1,000 newborns and in 2 per 1,000 young children and may influence the development of language, cognition and social and emotional functioning.

Historically, deaf and hard of hearing (DHH) individuals with mental disorders were regarded as different from other patients with mental disorders. This probably resulted from non-optimal developmental conditions, particularly from problems of language and communication. A series of societal, educational and medical advances have taken place since the start of clinical research in mental health and deafness. The changes seen in the last century have dramatically changed the life conditions of DHH populations, resulting in improved access to language, education and participation in working life, as well as a change in status: from being viewed as disabled to taking part in society as active citizens. In the context of these societal changes, there is a need to build the evidence base from which adequate interventions and treatment may follow. At the onset of this study, central needs were identified: the need for valid and reliable instruments for assessing mental disorders and trauma in DHH individuals who use sign language; the need for clinicians with culture and language proficiency to precisely assess, diagnose and treat DHH patients; the need for studies that contribute new knowledge about the distribution of mental disorders and symptom levels of mental distress in DHH patients, and about traumatic experiences and their subsequent impact on DHH individuals with mental disorders. Therefore, the study included both methodological and clinical aims.

The psychometric properties of a Norwegian sign language (NSL) version of the Mini International Neuropsychiatric Interview (MINI) were investigated. The results indicated that the NSL version of the MINI is a reliable diagnostic interview for assessing mental disorders in signing DHH persons, provided that it is used by professionals with appropriate sign language skills and knowledge about the patient group.

The study compared the distribution of mental symptoms and disorders and demographic characteristics in DHH patients using NSL and DHH patients using spoken language who were referred for assessment and treatment to specialized psychiatric outpatient services for the DHH population. More specifically, the following factors were compared...
between the linguistic groups: demographic characteristics, main mental disorders, symptom intensity of mental disorders, psychiatric and medical comorbidity, and levels of general functioning and distress. The results showed that more signing patients were deaf, that they had not shared a common language with their childhood caregivers, and that they had more often attended schools for DHH children. On the other hand, more patients using spoken language reported medical comorbidity. More somatic complaints and greater perceived social isolation indicate higher stress levels in DHH patients using spoken language than in those using sign language. Apart from these findings, the level of mental distress and daily functioning did not differ significantly between the groups; neither did the distribution of mental disorders.

Contrary to previous research, the study findings indicate that the distribution of mental disorders in adult DHH psychiatric outpatients is similar to the distribution of mental disorders in psychiatric outpatients from the general hearing adult population.

The study also investigated the prevalence of traumatic events and subsequent traumatization in adults referred to specialized psychiatric outpatient units for DHH patients and the associations between these experiences, mental distress, and demographic characteristics of the sample. Most of the DHH patients reported having experienced high-impact traumatic events. Patients who had experienced childhood trauma were significantly younger at onset of mental disorder and presented more severe symptoms of mental distress than did patients who had experienced trauma in adult life only, indicating that trauma early in life may be associated with more severe symptoms and earlier onset of mental disorder. The different patterns of traumatization found in female and male patients were similar to patterns found in clinical samples from the general population. The lack of significant associations between frequency of trauma and school setting, and between communicative competence of childhood caregivers and degree of traumatization, are not in line with previous research findings. These results may reflect changes in both parent knowledge of sign language and deaf culture. Moreover, school environments may have improved since the samples of earlier studies were collected.

As the Norwegian specialized mental health services for the DHH population were originally established to serve the signing deaf and deaf-blind population with severe psychiatric disorders, an unexpected finding was that half of the patients who participated in this study use spoken language, and approximately half of them are hard of hearing. The causes for these patients’ referral to the specialized services have not been explored, and therefore may only be inferred: ongoing dissemination of information about the services,
paired with patients’ acknowledgement of the advantages offered by the professionals’ clinical and communicative expertise.
**List of abbreviations**

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<td>CI</td>
<td>Cochlear Implant</td>
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<td>dB</td>
<td>Decibel</td>
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<td>DHH</td>
<td>Deaf and hard of hearing</td>
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<td>ESMHD</td>
<td>European Society for Mental Health and Deafness</td>
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<td>GAF</td>
<td>Global Assessment of Functioning</td>
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<td>MINI</td>
<td>Mini International Neuropsychiatric Interview</td>
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<td>NSHP</td>
<td>Norwegian National Unit for Hearing Impairment and Mental Health</td>
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<td>NSL</td>
<td>Norwegian Sign Language</td>
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<td>PTSD</td>
<td>Post-traumatic stress disorder</td>
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<td>Symptom Check List 25</td>
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<td>SNHL</td>
<td>Sensorineural hearing loss</td>
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<td>TEC</td>
<td>Traumatic Experiences Checklist</td>
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<td>World Health Organization</td>
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Paper I

Paper II

Paper III
Introduction

“Given the current limited evidence base, there is a pressing need for clinically useful research in the area of deafness and mental health” (Connolly, Rose, & Austen, 2006, p. 59).

Hearing loss in the first years of life may influence the development of language, cognition and social and emotional functioning (Basilier, 1964, 1973; Fellinger et al., 2005a; Hintermair, 2006; Smith & Gooi, 2014). Hearing occurs in 1 to 2 per 1,000 newborns and in 2 per 1,000 young children (Chadha, Chadha, & James, 2009; Nance, 2003; Smith, Bale, & White, 2005; Smith & Gooi, 2014). Most individuals with severe hearing loss do not develop mental problems in the course of their life; however, living life without typical hearing may pose additional challenges for those at risk of developing mental disorders (Carvill, 2001; Cooper, 1976; Hindley, 1997; Kitson & Fry, 1990).

Historically, it has been thought that the psyche of mentally ill deaf and hard of hearing (DHH) individuals differs from that of the psychiatric patients from the general, hearing population (Basilier, 1964, 1973; Grinker, 1969; Rainer & Altshuler, 1966; Remvig, 1969). The literature on deafness and mental health is extensive, but most of it discusses mental health and deafness from a practical perspective without providing new data. This applies especially to the literature on mental disorders in DHH adult outpatients. Adults who have been deaf or hard of hearing from birth or childhood and who develop mental disorders are an understudied population and the evidence base is limited (de Bruin & de Graaf, 2004/2005; Diaz, Landsberger, Povlinski, Sheward, & Sculley, 2013; Fellinger, Holzinger, & Pollard, 2012). Severe hearing loss from birth or early childhood may in particular affect language development, communication and access to information that is crucial for the cognitive, emotional and social development and functioning of the individual (e.g., Basilier, 1964, 1973; Fellinger et al., 2005a; Hintermair, 2006). Problems related to language development, non-optimal communication and social interaction caused by hearing loss may increase the risk of mental distress and disorders (Andersson & Lawenius, 1997; Black & Glickman, 2006; Connolly, Rose, & Austen, 2006; Dalton, 2011; de Graaf & Bijl, 2002; Israeliite, Ower, & Goldstein, 2002).

Traditionally, DHH people have been excluded from general studies of mental health, partly because hearing loss was considered their main problem, partly due to communication problems with the researchers, and also because the signing population has been difficult to
recruit. Prevalence estimates of mental disorders in the DHH population are hard to determine as most countries do not have central registers of the entire DHH population. Neither is it customary to register hearing status when patients are admitted to mental health services. Studying aspects of mental disorders within a defined patient population may supplement epidemiological research, as knowledge about the distribution of mental disorders in clinical samples is important because this distribution may indicate the treatment needs of the patient group.

Recent studies indicate that there is insufficient knowledge about the psychosocial development, quality of life, and mental health and disorders in the DHH population with congenital and childhood hearing loss who use spoken language (Antia, Kreimeyer, & Reed, 2010; Jamieson, 2010; Marschark, Spencer, Adams, & Sapere, 2011). The majority of studies have focused on the situation of the signing DHH population (e.g., Appleford, 2003; Diaz et al., 2013; Fellinger et al., 2005a; Fellinger, Holzinger, Schoberberger, & Lenz, 2005b; Fellinger, Holzinger, Sattel, & Laucht 2008), and even if DHH individuals who use spoken language by far outnumber those who use sign language, their mental health and disorders have gained little attention (Antia et al., 2010; Jamieson, 2010; Leigh, 2010; Marschark et al., 2011). There is an urgent need to gain knowledge about the mental health and disorders in DHH individuals who use spoken language, as there is reason to believe that this group will be growing in the future because of medical and technical advances like newborn hearing screening and cochlear implantation. Therefore, it is important to reinforce the knowledge base in order to implement optimal developmental conditions for this population (Jamieson, 2010; Laugen et al., 2016).

The specialized mental health services for the DHH population in Norway were set up in 1979 to serve signing deaf and deaf-blind patients with severe mental disorders. What makes these services “special” is that the professionals working there have expertise in clinical psychology and psychiatry in combination with skills in the language and communication methods of the patient population, as well as comprehensive knowledge of deaf culture and the potential psycho-social consequences of growing up with, or acquiring, severe hearing loss. In the first 30 years of the service’s practice, no systematic clinical study of the DHH patient population was conducted, and consequently, the following questions were left unanswered: Who are these patients, and what mental disorders lead them to the specialized services?

Generally, knowledge is scarce about how different types and degrees of hearing loss may interact with other factors such as age at onset of hearing loss, language preference,
childhood conditions and educational background. This study explores how hearing loss and deafness may interact with other variables in the development of mental distress and disorders. The study also examines the frequency and impact of traumatic experiences in adult DHH psychiatric outpatients.

**Aspects of hearing loss and deafness**

The DHH population is highly heterogeneous and may be identified according to various characteristics, including etiology, severity and age at onset of hearing loss, or linguistic and cultural identity (Austen & Coleman, 2004; Israelite et al., 2002). A distinction is often made between deaf and hard of hearing individuals, but the borderline between them is not sharp (Hindley, 1997). “Hard of hearing” most often refers to people with hearing loss ranging from mild to severe. They usually communicate through spoken language and can benefit from hearing aids, cochlear implants (CIs) and other assistive devices, as well as captioning. “Deaf” people mostly have profound hearing loss, which implies very little or no hearing. They often use sign language to communicate and may benefit from CIs (World Health Organization, Fact sheet No300, 2015).

There are approximately 5,000 individuals in Norway who use Norwegian Sign Language (NSL) (Stortingsmelding 35, 2007/2008). Currently, the DHH population is changing due to medical advances, including vaccinations, cochlear implantation and genetic counseling.

**Etiology of hearing loss and deafness, and associations with mental disorders**

Deafness and hearing loss may result from a variety of etiologies, some of which may play a causal role in the development of a series of other disorders, such as visual impairment, autism, learning disorders or attention deficit disorder (e.g., Carvill, 2001; Easterbrooks & Handley, 2005/2006; Miner, 1997; Vernon & Rhodes, 2009), and may impact on the individual’s vulnerability to developing mental distress and disorders. The etiologies of hearing loss may be classified as follows (Chadha et al., 2009; Morton, 1991; Nance, 2003; Smith & Gooi, 2014):

*Conductive hearing loss* implies a *mechanical problem* in the outer or middle ear that limits the amount of external sound that can gain access to the inner ear. It can be caused by congenital anomalies, infections and trauma to the outer or middle ear, obstruction of the
outer ear, and tympanic membrane perforation or tumors in the middle ear. Conductive hearing loss may be hereditary or nonhereditary.

*Sensorineural hearing loss* (SNHL) involves the inner ear, the cochlea, the auditory nerve, or the brain; it can be *congenital* (detected at or shortly after birth) or *acquired*. Congenital SNHL may be hereditary or nonhereditary.

Hearing loss can be mixed, a combination of conductive and sensorineural hearing loss.

*Nonhereditary* etiologies involve damage to the developing cochlea caused by intrauterine infection (most common: cytomegalovirus, herpes simplex virus, toxoplasmosis, rubella and syphilis), medication or toxins. Also, congenital malformations of the inner ear may cause SNHL.

*Hereditary* (genetic) causes account for approximately half of the cases of SNHL; of these, one third are syndromic (e.g., Usher syndrome, Waardenburg syndrome, Pendred syndrome, Jervell, Lange-Nielsen syndrome) and two thirds are non-syndromic. Hereditary hearing loss may be congenital, progressive from birth or develop in childhood. Hereditary hearing loss may be autosomal recessive (80%) or autosomal dominant (15%), X-linked (2-3%) or mitochondrial. Connexin deafness, which is caused by recessive mutations, is the most common genetic form of hearing loss in Europe and the United States (Carlsson et al., 2012; Nance, Lim, & Dodson, 2006).

*Causes of acquired SNHL* include hyperbilirubinemia (Rhesus or ABO blood group incompatibility), prematurity, bacterial meningitis in childhood, ototoxic drugs (antibiotics, chemotherapeutic agents), noise exposure, trauma, and tumors.

There can be *central hearing loss* (dysfunction of the central auditory nervous system); central auditory processing disorder and auditory neuropathy/auditory neuropathy spectrum disorder, both occurring after the sensory reception of auditory signals, and prior to language processing or comprehension (Smith & Gooi, 2014).

Some of the above-mentioned etiologies of hearing loss, specifically intrauterine infections and bacterial meningitis, have been found to carry a heightened risk for developing additional disorders, including mental disorders; for example, prenatal exposure to rubella was found by Brown, Cohen, Greenwald and Susser (2000) to be associated with non-affective psychosis in adulthood. Childhood meningitis was found by Gattaz, Abrahão and Foccacia (2004a, 2004b) to be one of the factors that may increase the risk of psychosis in adulthood. Another study investigating the long-term neurobehavioral outcome of bacterial meningitis in childhood (Anderson, Anderson, Grimwood, & Nolan, 2004) found that
children with a history of meningitis were at greater risk for impairment in intellectual, academic and executive ability than matched controls. Christie and associates (2011) studied the long-term outcomes of pneumococcal meningitis in childhood and adolescence and concluded that it causes reduced cognitive function, diminished quality of life and psychological distress, in addition to hearing loss.

The etiology of deafness is often unknown; accordingly, many DHH individuals do not know the cause of their hearing loss (Black & Glickman, 2006; de Bruin & de Graaf, 2004/2005; Haskins, 2004; Picard, 2004; Vartiainen, Kemppinen, & Karjalainen, 1997).

Severity of hearing loss

Degrees of hearing loss and hearing impairment are usually given as the average decibel (dB) loss of the better hearing ear, measured at 500, 1000, 2000 and 4000 Hz. The WHO (2015) classification gives the following grades of hearing impairment:

0. No impairment; 25 dB or better: No or very slight hearing problems. Able to hear whispers.
1. Slight impairment; 26-40 dB: Able to hear and repeat words spoken in normal voice at one meter. Counseling is recommended, and hearing aids may be needed.
2. Moderate impairment; 41-60 dB: Able to hear and repeat words spoken in raised voice at one meter. Hearing aid is usually recommended.
3. Severe impairment; 61-80 dB: Able to hear some words when shouted into better ear. Hearing aid is needed, and if no hearing aids are available, lip-reading and signing should be taught.
4. Profound impairment, including deafness; 81 dB or greater: Unable to hear and understand even a shouted voice. Hearing aids may help understanding words. Additional rehabilitation is needed. Lip-reading, and sometimes signing, is essential.

Grades 2, 3 and 4 are classified as disabling hearing impairment.

In conversations, persons with moderate and severe hearing loss may be functionally deaf, i.e., unable to hear and understand even a shouted voice, especially in a noisy environment, as conversational speech is approximately 50-70 dB (van Gent, 2012). Hearing loss measured in decibels (dB) indicates functional disability but does not always precisely provide information about either the person’s subjective experience of reduced ability to hear or their preferred language or cultural and social identity (Grønlie, 2005; Hindley, 1997; Israelite et al., 2002; Maxwell-McCaw & Zea, 2010).

Among children diagnosed with congenital or childhood (≤ 8 years) hearing loss, moderate hearing loss has been reported in 34-50% of cases, severe hearing loss in 17-34% of
cases, and profound hearing loss in 20-30% of cases, depending on definitions and samples (Caluraud et al., 2015; Holzinger, Weishaupt, Fellinger, Beitel, & Fellinger, 2016; Wake, Poulakis, Hughes, Carey-Sargeant, & Rickards, 2005). Degree of hearing loss has not been found to predict quality of life or psychosocial outcome (Dammeyer, 2010; Fellinger et al., 2008).

Age at onset of hearing loss
Congenital and childhood hearing loss affect considerably fewer individuals (1-2 per 1,000 children) (Chadha et al., 2009; Nance, 2003; Smith et al., 2005; Smith & Gooi, 2014) than does hearing loss later in life. The majority of the 360 million people in the world who have a disabling hearing loss are adults; in fact, one out of every three people older than 65 years is affected by hearing loss (WHO, 2015). Therefore, acquired hearing loss may be considered part of the normal aging process, whereas severe hearing impairment acquired in young or adult life may constitute a severe loss for the individual, often accompanied by reactions of grief, sadness, and depression (de Graaf & Bijl, 2002; Fellinger et al., 2012). The afflicted person has lived his or her life as a hearing person and identifies as such. The hearing loss requires the person to adapt to and cope with his or her new life situation. Hearing loss of any degree that is acquired after early childhood involves challenges that are similar to, but also distinctly different from, those of individuals with congenital or childhood hearing loss.

The deaf and hard of hearing population
Developmental aspects
Most aspects of DHH children’s lives are similar to those of other children, but their hearing loss or deafness may influence parent-child communication, emotional bonding, and the child’s emotional, cognitive and social development (e.g., Hintermair, 2006; Wake, Hughes, Poulakis, Collins, & Rickards, 2004). More than 90% of DHH children are born into families with no prior knowledge about life with hearing loss and the challenges of DHH children, or their capabilities for communicating and receiving information from the environment (Mitchell & Karchmer, 2004; Moores, 2001). Before the implementation of newborn hearing screening (Anderssen, Andresen, Andersen, & Sponheim, 2002), the hearing loss of many DHH children was not detected until they were between two and three years of age, and their language development was thus delayed or impaired (Vaccari & Marschark, 1997). The
challenges faced by DHH individuals who use different languages and modes of communication are similar in part, but also significantly different.

**Language and communication**

Most people who are deaf from birth or at an early age, and a proportion of the severely hard of hearing, use sign language, and some use sign-supported or manually coded speech (Austen & Coleman, 2004). Sign languages are natural languages that have evolved through use by DHH people. Utterances are produced with the hands and face and are visually received and decoded (Klima & Bellugi, 1979; Stokoe, 1960). Sign languages share many linguistic characteristics with spoken languages, but also have characteristics specific to the manual-visual modality (Emmorey & Lane, 2013; Klima & Bellugi, 1979; Stokoe, 1960). Most DHH adults who are signers use written language and consider it their second language. Nevertheless, a considerable percentage of people with congenital and early acquired deafness and hearing loss struggle with written texts, because of the fundamental differences in modality and syntax between signed and written language (Hendar & O’Neill, 2016; Marschark et al., 2011; Steinberg, Lipton, Eckhardt, Goldstein, & Sullivan, 1998). Individuals who use sign language are visually oriented and do not rely primarily on their residual hearing for communication. Most DHH individuals who use sign language acknowledge the mutual need for an interpreter, written communication or spoken language in interactions with non-signing people.

The majority of the hard of hearing population, and individuals who are post-lingually deaf, use the spoken language(s) of the society to which they belong. When communicating, they rely on their residual hearing, speech-reading, and conventional hearing aids or CIs (Austen & Coleman, 2004; Barnett, 2002; Middleton et al., 2010). DHH individuals who use spoken language are less noticeable within the majority society, and thus their hearing loss is often not noticed by others.

The distinction between DHH individuals who use signed language and those who use spoken language is essential, as their social identity (Andersson & Lawenius, 1997; Israelite et al., 2002) and life situations, perceived stressors and experiences may differ significantly (Austen & Coleman, 2004; Brown & Cornes, 2015; Breivik, 2007; Ladd, 2003).

Good communication and language abilities in childhood and the quality of communication with parents and caregivers have been found to be central to the psycho-social development of DHH children (Brown & Cornes, 2015; Dammeyer, 2010), while language
asymmetry between parents and DHH children has been considered a risk factor for mental health problems (e.g., Brown & Cornes, 2015; Wallis, Musselman, & MacKay, 2004).

The situation of DHH individuals who use sign language
DHH children, who are born to signing DHH parents, and whose hearing loss or deafness was detected at birth or in early childhood, most often develop sign language in a way that parallels the spoken language development of hearing children (Meadow, Greenberg, Erting, & Carmichael, 1981; Øhre, 1987; Slowikowska, 2011; Woll, 2015). This is also true of most hearing children with DHH signing parents (Woll, 2015). However, the majority of DHH children are raised by parents with limited sign language skills (Mitchell & Karchmer, 2004; Moores, 2001).

Many DHH individuals who are now adults were sent to residential schools at the age of seven without knowing where they were going or why because they did not share sufficient language with their parents (Fundudis, Kolvin, & Garside, 1979; Gronlie, 2005). In Norway, these schools were often residential and located far away from the family home, and studies have found that many of the children perceived this as traumatic (e.g., Kvam, 2004; Kvam & Loeb, 2010). Being sent away might have weakened the children’s attachment to their families and made them more vulnerable to mental distress, as they lacked a familiar person to turn to for comfort and reassurance. On the other hand, at school the children met DHH peers with whom they shared language and experiences. Younger children were raised, socialized and acculturated by the older students, and friendships may have, to some extent, ameliorated distress resulting from the separation from parents and siblings (Breivik, 2007; Ladd, 2003). The children’s identification with the minority culture of the signing DHH population, first encountered among the children at school, is likely to have been a protective factor against developing psychosocial problems and mental distress (Jambor & Elliott, 2005; Newman, Lohman, & Newman, 2007).

Over their lifetime, members of the signing DHH population face communicative challenges in their interaction with the majority population, as very few in this population know sign language (Fellinger et al., 2005a). Moreover, DHH individuals traditionally have been regarded as disabled and as holding a marginal status in society (e.g., Widell, 1993). In recent years, national sign languages have been acknowledged as formal languages, and the signing population is, to a larger extent, recognized as a cultural and linguistic minority (Breivik, 2007; Ladd, 2003; Widell, 1993). The shift from viewing DHH individuals in a medical and disability perspective to applying a socio-cultural view implicates the
acknowledgment that signing DHH individuals primarily experience their surroundings via the visual sense, use sign language, and identify with deaf culture, which has its own language, history, traditions, art, and values (e.g., Maxwell-McCaw & Zea, 2011; Meadow-Orlans & Erting, 2000). Like other minorities, DHH signers socialize with each other and tend to live in the same neighborhoods, often in urban areas where there is a school or another institution or organization that they are affiliated with (Breivik, 2007; Ladd, 2003). It has been demonstrated that DHH signers who live far from other signers are more at risk for social isolation and mental distress (Baslier, 1964, 1973). However, new communication technologies (e.g., the Internet, telecommunication and videophone) have reduced the consequences of geographic isolation (e.g., Power & Power, 2009).

**The situation of DHH individuals who use spoken language**

Most DHH adults who have congenital or childhood hearing loss, and who use spoken language, spent their childhood and school-age years at home with their family, sharing the same language, although often without their parents or teachers acknowledging their need for communicative and environmental adaptations (Dalton, 2011; Herheim, 2015). Outside the home, at school or during leisure time with peers, DHH children have been found to be at risk of being bullied, mocked and socially isolated, likely because of the communicative challenges they face and their inexperience, caused by reduced access to information (Fellinger, Holzinger, Beitel, Laucht, & Goldberg, 2009; Herheim, 2015). Often, parents are not aware of their child’s social isolation and physical complaints (Fellinger et al., 2008). Peer group membership and a sense of belonging may be key protective factors against developing mental disorders (Fellinger et al., 2009; Newman et al., 2007). Both in their family and in society at large, DHH individuals who use spoken language face the same expectations to perform as do individuals with typical hearing (Wake et al., 2004).

Listening is strenuous for a person with severe hearing loss. It requires that the person be attentive both visually and cognitively, and that he or she actively concentrates on interpreting the sounds and content of the message that is being communicated. In quiet surroundings, conversations with one or two persons may go quite well, but in larger settings with many people and environmental visual and auditory disturbance, the person may have almost no functional hearing. Non-verbal cues and speech-reading are essential, but many words sound and look alike when spoken. DHH individuals who use spoken language thus risk missing information, and may respond inappropriately because they have misunderstood. When meeting such communicative challenges, these individuals may be vulnerable to both
internal (emotional states, thoughts, assumptions) and external (visual and auditory) distractions which may interfere with or hinder the communication process and their comprehension of what is being communicated. The uncertainties associated with the communication process may lead to concerns about misunderstanding and being misunderstood and a feeling of being at loss or making a fool of oneself. When a person constantly fears that this may happen, the result is often physiological and psychological stress, increased muscle tension, headaches and exhaustion (Eriksen & Ursin, 2004; Fellinger, Holzinger, Gerich, & Goldberg, 2007; Israelite et al., 2002).

Sign language is visible and signers are easily detected, in contrast to DHH persons who use spoken language and therefore may not be identified as having a significant hearing loss, or who may wish to hide it. Because DHH individuals who use spoken language blend in with the general population and hearing loss is invisible, they must often actively inform others about their condition. Hearing communication partners may ignore or forget the DHH individual’s need for adaptations in communication and listening. Thus, in spite of sharing their language, these DHH individuals often struggle to communicate with family and peers. Moreover, some are reluctant to self-identify as deaf or hard of hearing, fearing stigma and social isolation (e.g., Dalton, 2011). Hard of hearing people who use spoken language report having restricted and dissatisfying social lives more often than signing deaf people (Fellinger et al., 2007).

**Aspects of psychopathology**

Mental disorders appear in clusters of symptoms in a continuum from a few to several with no qualitative difference or sharp line dividing healthy from unhealthy. When symptoms can be said to be additive in this way, it is not unlikely that a (deaf or hard of hearing) person who is already in a demanding life situation (because of a multitude of challenges related to communication and access to information) will be exceedingly burdened by less mental strain than would a (hearing) person without the additional challenges. Based on this, there has been a general assumption that the prevalence of mental disorders is higher in the DHH population than in the general population (Carvill, 2001; Cooper, 1976; de Graaf & Bijl, 2002; Fellinger et al., 2012; Hindley, 1997; Kitson & Fry, 1990).

Many factors may contribute to the development of mental disorders; biological factors and adverse life conditions may lead to the development of psychopathology. According to developmental psychopathology and the diathesis–stress model (Monroe &
Simons, 1991), mental disorders result from individual vulnerability on the one hand and environmental risk on the other (Cicchetti & Cohen, 2006; Horowitz, 1987; Sameroff, 2014). Early adulthood seems to be the age of onset of most mental disorders (Kessler, Chiu, Demler, & Walters, 2005).

The most prevalent mental disorders in the general population are anxiety disorders, depressive disorders and disorders resulting from psychoactive substance use (Kessler et al., 2005; Kringlen, Torgersen, & Cramer, 2001; Sheehan et al., 1998). The prevalence of adult personality disorders is approximately 13% (Torgersen, Kringlen, & Cramer, 2001). Personality disorders are usually assumed to be related to adverse childhood conditions, and because of the complexity of the communicative challenges many DHH individuals experience during their childhood years, one might expect a relatively high prevalence of personality disorders in the prelingually deaf population.

Comorbidity of mental disorders is common. Several international studies reveal a high prevalence of drug abuse disorders in general clinical populations receiving treatment from mental health services. This applies especially to patients suffering from the most severe psychiatric disorders (Duke, Pantelis, & Barnes, 1994; Fowler, Carr, Carter, & Lewin, 1998; Mueser, Yarnold, Rosenberg, Swett Jr, Miles, & Hill, 2000).

Mental disorders may result from an individual’s non-optimal coping strategies and patterns of adaptation to life experiences. Responses once effective in dealing with life’s challenges may turn into rigid and ineffective patterns of thinking and behavior (Sroufe & Rutter, 1984). Development cannot be separated from the social context in which it occurs (Bronfenbrenner, 1977), and the development of mental disorders may be viewed as part of the dynamic relation between the individual and his/her context (Sameroff, 2014). With this in mind, a deaf or hard of hearing child whose family members are all hearing may be at risk because communication and language form the basis for the conceptual and emotional processing of experiences and events and therefore play a crucial role in preventing mental disorders (Pynoos, Steinberg, & Piacentini, 1999). The quality of parent–child communication may have far-reaching consequences for parent–child emotional bonding and for the child’s emotional, cognitive, and social development. Problems of language and communicative ability have been linked to the development of psychopathology in DHH people (Basilier, 1964, 1973; Black & Glickman, 2006; Connolly et al., 2006; de Graaf & Bijl, 2002; Hindley, 1997), and studies of clinical DHH samples report a high proportion of signers (e.g., Black & Glickman, 2006; Haskins, 2004; Landsberger & Diaz, 2010; McClelland, Chisholm, & Powell, 2001).
The start of mental health services for the DHH population

Until the 1950s, DHH patients with mental disorders worldwide were treated in services for the general population (Vernon & Daigle-King, 1999). Little is known about the lives of DHH individuals in Norway before the first school for the deaf was established in Trondheim in 1925 by P.A. Møller who was deaf and had received teacher training in Copenhagen. Table 1 gives a brief historic overview of early services and studies.

At the second Nordic Congress of the Deaf (Andra Nordiska Döfstumkongressen) in Stockholm in August 1912 one of the topics was that in the regular mental hospitals, DHH patients were placed in separate wards and had no opportunity for contact or communication with each other, and received literally no treatment. Basilier (1973) made a survey of deaf inpatients in Norwegian mental hospitals, and he found the situation largely unchanged.

One finding of Basilier’s study was that the prevalence of deaf patients in mental hospitals was high compared to patients from the general population. The reasons for this were complex and include few possibilities for rehabilitation and lack of support in their community, lack of appropriate assessment and treatment at the hospitals, and lack of specialized post-hospitalization placements (Basilier, 1973). Basilier initiated the process to set up a specialized unit for deaf and deaf-blind patients within a psychiatric hospital. In 1978 an ambulatory psychiatric team for deaf adults was established at Gaustad hospital in Oslo, and in 1979 this hospital opened a special unit for psychiatric treatment of signing deaf and deaf-blind adult patients. The services of this small unit expanded, and in 2008 the Norwegian National Unit for Mental Health and Hearing Impairment was officially opened.

Within the period 1950–1970 many Western countries acknowledged the signing deaf population’s needs for appropriate mental health services. In the years 1963 to 1991 inpatient and outpatient services for deaf patients were established in several countries, see Table 1. DHH people with mental disorders represent small numbers in countries with small populations; therefore, to initiate improvement in mental health services and the exchange of ideas and experience, the European Society for Mental Health and Deafness (ESMHD) was established in 1986. The ESMHD is an international non-governmental organization for the promotion of the positive mental health of deaf people in Europe and has representatives from most European countries and from other continents (Retrieved from www.esmhd.org).
Table 1  
*Brief historic overview of the development of mental health services for the DHH population and early studies of deafness and mental disorders*

<table>
<thead>
<tr>
<th>Services / organizations</th>
<th>Year</th>
<th>Studies</th>
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<tbody>
<tr>
<td>The second Nordic Congress of the Deaf, Stockholm, Sweden</td>
<td>1912</td>
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<tr>
<td>Outpatient services for the deaf,</td>
<td>1929</td>
<td>Hansen, Denmark, inpatients, N=36</td>
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<tr>
<td>New York Psychiatric Institute, USA</td>
<td>1963</td>
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<tr>
<td>Inpatient unit for the deaf,</td>
<td>1966</td>
<td>Rainer &amp; Altshuler, USA, inpatients, N=230 &amp; outpatients, N=50</td>
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<tr>
<td>Rockland State Hospital, USA</td>
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<tr>
<td>Unit for deaf patients,</td>
<td>1968</td>
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<tr>
<td>Whittingham Hospital, England</td>
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<tr>
<td>Unit for the deaf,</td>
<td>1969</td>
<td>Remvig, Denmark, inpatients, N=31.</td>
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<tr>
<td>Glostrup hospital, Denmark</td>
<td></td>
<td>Grinker, USA, in- &amp; outpatients, N=159</td>
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<td></td>
<td></td>
<td>Denmark &amp; Eldridge, UK, inpatients, N=170</td>
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<tr>
<td>Services for the deaf at Långbro, Stockholm, Sweden</td>
<td>1972</td>
<td>Denmark, Eldridge &amp; Warren, UK, inpatients, N=109</td>
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<td></td>
<td>1973</td>
<td>Basiliær, Norway, inpatients, N=94</td>
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<tr>
<td>Ambulatory psychiatric team,</td>
<td>1978</td>
<td>Robinson, USA, inpatients, N=150</td>
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<td>Gaustad hospital, Oslo, Norway</td>
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<tr>
<td>Psychiatric day unit,</td>
<td>1979</td>
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<tr>
<td>Gaustad hospital, Norway</td>
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<tr>
<td>Outpatient clinic for the deaf,</td>
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<td>Stockholm, Sweden</td>
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<tr>
<td>ESMHD established</td>
<td>1986</td>
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<tr>
<td>Outpatient services for DHH children and adolescents, the Netherlands</td>
<td>1987</td>
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<tr>
<td>Ward for deaf inpatients and rehab,</td>
<td>1990</td>
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<tr>
<td>Helsinki University Hospital, Finland</td>
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<tr>
<td>Inpatient and outpatient services</td>
<td>1991</td>
<td>Pollard, USA, outpatients, N=343</td>
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<td>For the DHH pop., the Netherlands</td>
<td></td>
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<tr>
<td></td>
<td>1994</td>
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</table>
Early studies on mental health and deafness

The clinical observations of the pioneer psychiatrists (e.g., Basilier, 1964, 1973; Grinker, 1969; Rainer & Altshuler, 1966; Remvig, 1969) treating and studying congenitally deaf patients with mental disorders were accurate, and much alike. Their conclusion was that the mentally ill deaf patient in some ways was different from the mentally ill patient from the general population. Basilier (1964; 1973) suggested the diagnosis surdophrenia to account for what he observed as being a cluster of symptoms seen in some deaf patients with mental disorders. Diagnoses including similar symptoms were suggested in the same time period by other researchers: primitive personality disorder (Rainer & Altshuler, 1966) and inadequate personality (Grinker, 1969). A brief review of Basilier’s work is presented below to represent the work of the early researchers.

Terje Basilier (1928–1974) was a dedicated psychiatrist and his extensive work laid the foundation for the Norwegian psychiatric services for the deaf and deaf-blind signing population. He identified the core challenges of early-onset deafness: “We who hear represent a challenge to the deaf and because of our failing capacity in helping the deaf, we represent their handicap. If everybody was deaf, there would be no such problem of mutual communication” (1964, p. 364). He describes the deaf child’s difficulty identifying problems of identification with his/her hearing parents, especially under circumstances that favored spoken language and even banned signed language.

Basilier (1973) emphasized the importance of a functional language for the cognitive, emotional and social development of the individual, and questioned the oral–manual debate relating to the language acquisition and education of DHH children. He brought attention to the risk of misdiagnosing deaf persons’ utterances and severe communication problems as symptoms of schizophrenia, and the seriously wrong treatment that could follow from this mistake. In this way, he emphasized the need for linguistically competent clinicians. His comment is a reminder to researchers and clinicians, even today: “It is important to stress that the general deaf citizens seem to be ordinarily happy family members who are stable in their work and who have a tendency to take the days as they come” (1964, p. 371).

Basilier (1964, 1973) maintained that congenital or early acquired deafness may result in a special personality profile, and proposed the term surdophrenia to describe this profile. The following symptoms define surdophrenia: language impairment (conceptual poverty and insufficient vocabulary), concrete thinking, restricted empathy, rigidity of action, and problems with generalization of knowledge. He further held that afflicted persons tend to
externalize responsibility and blame others, to overestimate own abilities and to address challenges in unrealistic ways.

As clinical experience accumulated, it evidenced that the “surdophrenic personality structure” could largely be explained by the restricted knowledge of some deaf individuals, caused by impoverished communication and inaccessibility of information. Basilier (1973) gathered information from four samples, of which three had been educated at schools for the deaf and one had been contacted from a registry of persons receiving disability benefits who had ear-related and hearing loss diagnoses. Basilier’s findings are informative of the samples he studied and in line with the findings of other researchers of the time (Grinker, 1969; Rainer & Althuler, 1966; Remvig, 1969). However, it is not known whether the samples of his study represent the total DHH population of his time.

Deaf and severely hard of hearing individuals need to have eye contact to communicate and receive information, and they must witness events to get information and gather experience and knowledge about facts, as well as about emotional and behavioral matters. Basilier raised the question of “whether it is the hearing loss per se or the multidimensional influences that follow with deafness that give the deaf person special characteristics” (Basilier, 1964, p. 365).

The first known study of DHH psychiatric inpatients was conducted in Denmark by the deaf Danish painter Viggo C. Hansen. His pioneering study was motivated by his concern for his fellow deaf countrymen with mental disorders and included 36 deaf patients in psychiatric hospitals in Denmark. He found 53% of the patients to be diagnosed with schizophrenia, and 3% with bipolar disorder (Hansen, 1929; Remvig, 1972; Vernon & Daigle-King, 1999).

Many years passed before the next European studies, conducted in Great Britain by Denmark and Eldridge (1969), examining 170 deaf inpatients in general mental hospitals. Among the patients, 39% were diagnosed with adjustment disorders, 21% with schizophrenia, and 12% with an unclassified psychosis. Denmark and Warren (1972) studied 109 patients in a unit for deaf patients at Whittingham Hospital in Lancashire, England. They found 43% had been diagnosed with schizophrenia, 31% with adjustment disorders, and 2% with bipolar disorders. In a Danish study of 31 deaf patients at Glostrup Hospital by Remvig (1969) 20% of the patients were diagnosed with schizophrenia, 20% with organic mental disorders and another 20% with an unclassified psychosis.

The first Norwegian study of 94 deaf patients in general psychiatric hospitals (Basilier, 1973) found 32% of the patients to be diagnosed with organic mental disorders, 28% with
schizophrenia, and 24% with depressive disorders. In the same time period there were four American studies: The New York State Studies (1963–1966) by Altshuler, Rainer and colleagues, which included 230 inpatients and 50 outpatients, found 52% and 54%, respectively, to have schizophrenia, 19% and 6% to have organic mental disorders, and 5% and 8% to have bipolar disorders (Rainer & Altshuler, 1966). Grinker’s study of 159 inpatients and outpatients at the Psychosomatic and Psychiatric Institute of Michael Reese Hospital in Chicago (1969) found that 27% of the patients had been diagnosed with schizophrenia and 6% with depressive disorders. Robinson (1978) studied 150 deaf inpatients at St. Elizabeth’s Hospital in Washington DC, and found 35% diagnosed with adjustment disorders, 27% with schizophrenia, and 17% with depressive disorders. Pollard’s (1994) study of 343 inpatients and outpatients in the Rochester, NY area found that 24% of the patients had a diagnosis of adjustment disorders, 14% of bipolar disorders, and 10% of organic mental disorders. He concluded that the prevalence of substance use disorders, disorders evidenced in childhood and anti-social personality disorder were significantly lower and the prevalence of intellectual disabilities significantly higher in the DHH sample than the hearing sample.

The results of the early clinical studies of DHH patients are not easy to compare because of differences in methodology. However, all the studies reported high percentages of severe mental disorders like schizophrenia (43%–54%) and organic mental disorders (19%–32%). It is notable that depression, if diagnosed at all, is only reported in 1.2% of patients until 1969 when two studies reported depression in 9.5% (Denmark & Eldridge, 1969) and 9.6% (Grinker, 1969) of the patients. The conclusion drawn by Vernon and Daigle-King (1999) in a review of these studies was that the overall prevalence of mental illness seemed to be significantly higher in the DHH population than in the general population. Moreover, there have been relatively few empirical studies, and even though both inpatient and outpatient services for deaf people with mental illness have increased more or less continuously in the United States and Europe since World War II, most of the relevant research dates from before 1980. After that, research activity was almost non-existent until 1994.

Recent research on mental disorders in general and clinical DHH samples

So far, studies have not been able to produce definite results on the prevalence and distribution of symptoms of mental distress and disorders in general and clinical DHH populations (Basilier, 1964, 1973; Remvig, 1969; Vernon & Daigle-King, 1999; Øhre et al., 2011). No clear evidence has been presented that psychiatric disorders are more or less prevalent in DHH people than in the general population. Therefore, a systematic search was
conducted for research publications about the prevalence and distribution of psychiatric symptoms and disorders published between 1995 and 2011 (Øhre et al., 2011). Eleven studies were identified, five with samples from the general DHH population (de Graaf & Bijl, 2002; Fellinger et al., 2005a; Kvam, Loeb, & Tams, 2006; Leigh & Anthony-Tolbert, 2001; Werndgren-Elgström, Dehlin, & Iwarsson, 2003) and with clinical samples including outpatients (Appleford, 2003; de Bruin & de Graaf, 2004/2005), inpatients (Appleford, 2003; Black & Glickman, 2006; Haskins, 2004), inpatients in locked units (Landsberger & Diaz, 2010), and residents of mental health institutions (McClelland et al., 2001). Table 2 lists the six clinical studies reporting psychiatric diagnoses and the distribution of the main diagnostic categories.

Appleford (2003) reviewed the clinical activity at Denmark House, a specialist unit offering mental health services to deaf people in England and Wales, during one year. The study included prelingually deaf inpatients and outpatients above eighteen years of age. A comparison group was drawn from a general psychiatric unit in the same hospital. The assessment was obtained from the patients’ records and chart notes of medical conditions, as well as clinical activity from the records in the computerized patient register. The results showed that when compared to hearing inpatient and outpatient samples, more deaf inpatients and outpatients were diagnosed with schizophrenia and related disorders, and fewer with affective disorders. Fewer deaf outpatients were diagnosed with neurotic stress-related and somatoform disorders and more deaf inpatients were diagnosed with personality disorders compared to the hearing samples.

Black and Glickman (2006) studied sixty-four severely and chronically mentally ill patients who had been discharged from the Deaf Unit at Westborough State Hospital in Massachusetts, USA, over a period of five years. Two comparison groups of hearing patients from the same hospital were included. The study used archival data from a five-year period, reviewing diagnostic assessments that had been administered by a specialist multidisciplinary team including a communication specialist. PTSD was the most common disorder among the deaf patients. Moreover, DHH patients were more likely than patients from the general hearing population to be diagnosed with a mood, anxiety, personality or developmental disorder and less likely to be diagnosed with a psychotic or substance abuse disorder. In addition, 75% of the deaf patients were diagnosed with language dysfluency.

De Bruin and de Graaf (2004/2005) examined the distribution of mental disorders in 107 male and 107 female patients attending an ambulatory mental health service at the Northwest Netherlands Mental Health Service for the Deaf and Partially Hearing (PsyDoN)
over a period of 13 years. Psychosocial problems (milder problem patterns) were diagnosed in 43% of the patients, and significantly more often in females than in males (50% vs. 35%). Mental disorders were diagnosed in 56% of the patients, the most frequent diagnoses being adjustment disorders (16%), depression (13%) and anxiety disorders (7%). The authors concluded that demographic and deafness-related characteristics in combination showed little connection to the severity of the mental health problems.

Haskins (2004) reviewed the records and charts of 43 patients at the Mental Health Center for the Deaf in Western State Hospital, Virginia, USA. Multiple diagnoses were reported: 63% of the patients had a diagnosis of schizophrenia, schizoaffective disorder, bipolar disorder or major depression, 58% had a psychotic disorder, and 26% of the patients had a dual diagnosis of major mental illness and substance abuse.

Landsberger and Diaz (2010) reviewed archival data to investigate the distribution of mental disorders in 30 deaf adults who had been admitted to a Midwestern state psychiatric hospital over a period of 10 years, after having been committed by the court to psychiatric treatment in locked psychiatric wards. A comparison group consisted of 60 randomly selected hearing inpatients from the same hospital. None of the psychiatrists who initially assigned diagnoses to the patients were fluent in sign language or specialists in mental health care of deaf patients. The study found that significantly more DHH patients were diagnosed with impulse control disorder and pervasive developmental disorder, and significantly fewer with substance use disorder, compared to patients from the general population.

McClelland and associates (2001) investigated mental health problems in deaf individuals aged 16 to 65 years receiving residential and other services in the UK. Among the 361 residents, 87% were signing, 5% were signing in deaf-blind mode and 6% were speaking English. The study found that the residents were under-diagnosed and had high levels of functional impairment and psychiatric illness, and that there was lack of contact with psychiatric services in spite of the residents’ obvious and significant mental health problems. One third were judged to pose a moderate or severe risk to themselves or others.
Table 2  The distribution of psychiatric diagnoses in clinical populations, numbers given in %

<table>
<thead>
<tr>
<th>Study &amp; Sample</th>
<th>Affective (mood) disorders,</th>
<th>Neurotic &amp; somato-form disorders,</th>
<th>Disorders due to psychoactive substance use</th>
<th>Schizophrenia, schizotypal delusional and psychotic disorders</th>
<th>Personality disorders</th>
<th>Other Diagnoses</th>
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<td>DHH</td>
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<td>Appleford 2003</td>
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<tr>
<td>Outpatients (O)</td>
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<td>51</td>
<td>19</td>
<td>8</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Inpatients (I)</td>
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<td>50</td>
<td>10</td>
<td>9</td>
<td>2</td>
<td>13</td>
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<td>Black &amp; Glickman 2006</td>
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<tr>
<td>Inpatients</td>
<td>39</td>
<td>21</td>
<td>42</td>
<td>9</td>
<td>33</td>
<td>42</td>
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<tr>
<td>De Bruin &amp; de Graaf 2004/2005</td>
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<td>Outpatients</td>
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<td>Inpatients</td>
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<td>Landsberger &amp; Diaz 2010</td>
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<td>Inpatients in locked units</td>
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<td>38</td>
<td>20</td>
<td>18</td>
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<td>Residents in mental health facilities</td>
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<td>In-depth study</td>
<td>19</td>
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<td>18</td>
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</tbody>
</table>

Notes
Deaf and hard of hearing patients = DHH, General (hearing) patients = G
* % calculated on the basis of numbers given by the author
PDD = Pervasive developmental disorder not otherwise specified,
ID = Intellectual Disability, Org. dis. = Organic disorders
The six clinical studies’ findings on the following diagnostic categories are presented in Table 2: depression, anxiety and somatoform disorders, schizophrenia, schizotypal, schizoaffective, delusional and psychotic disorders, personality disorders, and disorders due to psychoactive substance use (for details, see Øhre et al., 2011). The results indicate that DHH patients and patients from the general population receive different psychiatric diagnoses. Disorders resulting from psychoactive substance use seem more prevalent in the hearing samples than in the DHH clinical samples. The studies report markedly different distributions of psychiatric diagnoses in clinical DHH samples and clinical samples from the general hearing population. Studies of non-clinical DHH population samples indicate that symptoms of anxiety and depression may be more prevalent in DHH adults with congenital and childhood hearing loss than in adults in the general population (Øhre et al., 2011).

All of the reviewed studies (Appleford, 2003; Black & Glickman, 2006; de Bruin & de Graaf, 2004/2005; Haskins, 2004; Landsberger & Diaz, 2010; McClelland et al., 2001) applied a retrospective approach, analyzing archival data. Retrospective studies are important because they are likely to give an ecologically valid picture of the assessment procedures that were used. They do not, however, give a unified and coherent picture of the mental disorders of the patients studied. This is because the researchers depend on the information that has been included in the charts and records. In addition to evaluating assessment specificity and precision, individual clinicians may give priority to and focus on different aspects of mental disorders and their development. The standard is likely to be less stringent than in prospective studies where identical assessment is implemented as part of the study. Moreover, diagnostic practices tend to undergo revisions and changes over time, potentially leading to inconsistencies in the information available in archival data.

To our knowledge, no recent studies have compared mental disorders in subgroups of the adult DHH population, e.g., between individuals with different degrees of hearing loss, or individuals who use different languages and modes of communication. Consequently, the knowledge on these topics is scarce and based on clinical experience.

**Trauma, mental disorders, and potential consequences of hearing loss**

Factors that may influence an individual’s reactions to trauma include biological vulnerability, age, social context, severity of the stressor, and previous and subsequent life events (Carlson & Dalenberg, 2000; Pynoos et al., 1999; van der Kolk, Roth, Pelcovitz, Sunday, & Spinazzola, 2005). Biological vulnerability may include a disabling hearing loss, defined by the World Health Organization (2014) as “a hearing loss greater than 40 dB in the better hearing ear.” A
disabling hearing loss may have negative effects on language and communication and make it more difficult to perceive and interpret actions and situations correctly (Greenberg & Kushé, 1998), including the actions of a potential offender (Schild & Dalenberg, 2012). In situations of emergency, DHH individuals may also struggle to detect potential helpers. Hearing loss may restrict access to information about emotional reactions, including consequences that normally follow traumatic experiences, and limit opportunities for sharing adverse experiences and receiving appropriate treatment (Anderson & Kobek Pezzarossi, 2011; Johnston-McCabe, Levi-Minzi, van Hasselt, & Vanderbeek, 2011). In a natural disaster or an accident, reduced hearing may affect a person’s ability to detect what is happening and to react adequately (Schild & Dalenberg, 2012). Because hearing loss may hinder the comprehension of verbal information, which may have consequences for the evaluation of a situation, DHH individuals may perceive events as traumatic that may be experienced as taxing but not traumatic by hearing people. The term information deprivation trauma was suggested by Schild and Dalenberg (2012, 2016) to denote traumatization resulting from a lack of adequate and sufficient information in deaf individuals.

Adjustment and healing after trauma require opportunities for sharing concerns and worries, as well as age-appropriate explanations and information. Communication and language form the basis for the conceptual and emotional processing of stressful events and therefore play a crucial role in preventing subsequent traumatization (Pynoos et al., 1999). Good communication and a common language between DHH children and their caregivers are vital for the appraisal of all types of life events (Brown & Cornes, 2014; Wallis et al., 2004); they also make it possible to share and understand emotional reactions when experiencing potentially traumatic events. However, Johnston-McCabe and associates (2011) found that domestic violence in adulthood occurred as frequently among DHH female patients who had had a shared language with their caregivers in childhood as it did among those who did not have a shared language with their parents. To our knowledge, the study by Johnston-McCabe and associates (2011) is the only one to provide empirical knowledge about the association between childhood caregivers’ communicative skills and the prevalence and impact of traumatic events in adult life.

**Studies of trauma in general hearing and general DHH populations**

Increasing research evidence shows that experiencing traumatic events may affect individuals’ mental and physical health and their cognitive functioning (e.g., Briere & Elliott, 2003; Briere, Kaltman, & Green, 2008; Felitti & Anda, 2010; Felitti et al., 1998; Pynoos et al., 1999; van
der Kolk et al., 2005). Childhood adversities are strongly associated with all types of mental disorder in all phases of life and across countries with different standards of living (Kessler et al., 2010; Krug, Mercy, Dahlberg, & Zwi, 2002). The International Classification of Diseases (ICD 10) (World Health Organization, 1993) defines trauma as “A stressful event or situation (either short- or long-lasting) of exceptionally threatening or catastrophic nature, which would be likely to cause pervasive distress in almost anyone” (p. 99). Other definitions specify that it is the person’s subjective experience that determines whether an event is traumatic or not (e.g., Giller, 1999; Saakvitne, Gamble, Pearlman, & Lev, 2000).

Trauma research tends to focus on events of physical abuse and/or sexual harassment and abuse in childhood; this is the case in both in clinical (Fosse & Dersyd, 2007; Peleikis, Mykletun, & Dahl, 2004; Schoedl et al., 2010) and non-clinical studies (e.g., Briere & Elliott, 2003; Jonas et al., 2011; Steine et al., 2012) of the general population. Little is known about traumatization in the DHH adult population, and even less about those in that population who develop mental disorders. Studies on traumatization in DHH adults suggest that DHH children may be more susceptible to neglect, abuse, maltreatment, and violence than children in the general population (Black & Glickman, 2006; Burnash, Rothman-Marshall, & Schenkel 2010, 2010; Kvam, 2004; Kvam & Loeb, 2010; Schild & Dalenberg, 2012; Sebald, 2008; Sullivan, Vernon, & Scanlan, 1987). Some studies (e.g., Kvam, 2004; Sullivan & Knutson, 1998; Vernon & Miller, 2002) report a high prevalence of traumatic experiences among DHH individuals who mainly attended residential schools or lived in institutions. Sullivan and Knutson (1998) found that placement in residential schools increased the risk of sexual and physical abuse. Studies (Kvam, 2004; Vernon & Miller, 2002) have reported an increased risk of abuse in residential schools, and Kouwenberg, Rieffe, Theunissen, and de Rooij (2012) found that DHH children in special education reported more peer bullying than those in mainstream education. Although communication and access to information remain problematic for many DHH individuals throughout their lifetimes, few studies have examined various types of traumatization in DHH individuals from a lifespan perspective.

Traumatic events of a relational character, like emotional neglect and abuse by close family members and family problems in childhood, are the most common types of traumatic events reported by a number of studies of the general hearing population (Janssen et al., 2004; Kernhof, Kaufhold, & Grabhorn, 2008; Nijenhuis, Van der Hart, & Kruger, 2002). These findings indicate that interpersonal traumatic experiences have the greatest impact on an individual’s mental health. Sullivan and Knutson (1998) found that neglect, physical abuse and sexual abuse committed by family members were the forms of maltreatment most
frequently reported by DHH children. Kvam (2004) found that 46% of the female participants and 42% of the male participants in a retrospective study of trauma in DHH adults reported unwanted sexual experiences prior to 16 years of age. Fifty-one percent of the DHH sample reported that the abuse had taken place in a residential school, and the abuser was a family member in another 19% of the cases. In the same sample, Kvam and Loeb (2010) found that 35% of participants reported symptoms of anxiety and depression on the Symptom Checklist-5 (Strand, Dalgard, Tambs, & Rognerud, 2003), a shortened version of the Symptom Checklist-25 (SCL-25) (Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974). The results indicated an association between negative childhood experiences and later mental health problems.

Burnash and associates (2010) found significantly more reports of childhood emotional, physical, and sexual abuse and emotional and physical neglect in a sample of DHH students than in a general sample of students. The DHH students also reported significantly more symptoms of post-traumatic stress disorder (PTSD). Schild and Dalenberg (2012) examined the frequency of potentially traumatic events in a sample of DHH adults recruited from organizations of the deaf. They found that all participants reported at least one event on the Life Events Checklist (Blake et al., 2000), and the average number of different trauma types was 6.2 which is rather high in a non-clinical sample.

Studies of trauma in clinical DHH samples are scarce, but some suggest a relationship between traumatic experiences and mental disorder. Black and Glickman (2006) found that 33 of the 64 deaf psychiatric inpatients in their study had a known history of abuse. Johnston-McCabe and associates (2011) found that 72% of the patients in their all-female DHH outpatient sample had been exposed to psychologically or emotionally abusive behavior by their partner; more than half had experienced physical partner violence, and one fourth had experienced sexual abuse.

The general trauma literature provides extensive evidence that women are abused and maltreated more than are men (e.g., Felitti & Anda, 2010; Hjemmen, Dalgard, & Graff-Iversen, 2002). Research on domestic violence and intimate partner violence in the DHH population is increasing (e.g., Anderson & Kobek Pezzarossi, 2011; Anderson & Leigh, 2011; Anderson, Leigh, & Samar, 2011; Johnston-McCabe et al., 2011; Pollard, Sutter, & Cerulli, 2014; Porter & McQuiller Williams, 2011). Findings suggest that young deaf women do not have access to adequate information and, consequently, knowledge about what constitutes violent actions (Anderson & Kobek Pezzarossi, 2011), and that there is an association between being deaf or hard of hearing and being physically and psychologically abused by a
partner (Johnston-McCabe et al., 2011; Porter & McQuiller Williams, 2011). However, less is known about other types of traumatic experiences in female and male DHH individuals.

**Valid and reliable assessment of mental disorders in DHH individuals**

To minimize the risk of misdiagnosis, mental assessment of DHH individuals requires clinically skilled, culturally sensitive professionals who are also fluent in sign language and can communicate directly with their DHH patients (Diaz et al., 2013; Fellinger et al., 2012; Pollard, 1994). Clinicians must also have a comprehensive understanding of the potential psychosocial consequences of profound hearing loss, the accompanying language and communication challenges, and the obstacles and opportunities encountered by many DHH individuals in society. Most signing DHH adults adjust their language and communication style depending on whom they are talking to, an ability requiring flexibility and understanding of the communicative partner’s language skills. These skills may in some instances be influenced by the person’s mental state and fluctuate according to their level of symptoms and functioning. Clinicians have to be aware that these adjustment skills may be reduced in individuals with mental disorders; consequently, the mutual understanding and communication between patient and clinician should be continuously evaluated. This is of most concern with signing patients, as clinicians who are not skilled in sign language and not used to communicating with DHH persons may misinterpret the patient’s utterances as symptoms of mental illness or thought disturbances (Baines, Patterson, & Austin, 2010; Basilier, 1964, 1973), or they may overlook symptoms of mental illness because such symptoms are not communicated in the expected manner.

Language and communication are fundamental to diagnosing most mental disorders, yet most assessment instruments are designed for use with hearing individuals. When used by general mental health services, many DHH individuals with mental disorders may receive incorrect diagnoses because of challenges in communication between patients and professionals (Black & Glickman, 2006; Vernon & Daigle-King, 1999). This lack of diagnostic precision may have serious consequences for treatment adequacy and quality. Therefore there is a need for valid and reliable instruments for the assessment of mental disorders in DHH individuals, especially those who use sign language as their preferred language.

Translation of spoken and written material into sign language requires knowledge of language and culture in addition to a thorough understanding of the content of the material to be translated. Translating diagnostic instruments of mental health involves precision, requires
a multidisciplinary approach, and is time-consuming. Utterances in different languages that appear to be similar may be interpreted differently; therefore, precision is required, especially when a written text is translated to a signed language (Jones, Mallinson, Phillips, & Kang, 2006; Mason, 2005). This is a matter of both semantic differences and differences related to cultural understanding of concepts, words (signs) and sentences. When translating assessment instruments like interview guides and self-reports, development of expressions that both convey the questions’ core content and appear meaningful to the patient is vital. In addition, when the patient’s answers are given as responses on a continuum-scale, care must be taken to secure that the response alternatives of the new language equal those of the original in degrees of intensity. When diagnostic tools are translated into a new language, reassessment of validity and reliability is necessary to ensure that the assessment instruments function adequately in the new language.

DHH individuals have been excluded from validation studies of assessment instruments in common use today, e.g., Mini International Neuropsychiatric Interview (MINI) (Lecrubier et al., 1997; Sheehan et al., 1997). The exclusion criteria include “language problems” (Lecrubier et al., 1997, p. 227; Otsubo et al., 2005, p. 518; Rossi et al., 2004, p. 561) and “patients who were hearing impaired, not fluent in English” (Pinninti, Madison, Musser, & Rissmiller, 2003, p. 362) or “could not be interviewed due to language barriers” (Mordal et al., 2010, p. 174). This highlights the need for appropriate assessment instruments that are checked for validity and reliability and found to show good psychometric properties.

There is a need for more reliable and valid assessment instruments to evaluate and diagnose symptoms of mental distress and disorders in the signing DHH population. Translating and using standardized assessment instruments enables identical assessment and comparison of DHH individuals and individuals in the general population. This approach requires that the psychometric properties of the translated instruments be satisfactory, and that assessments are carried out by professionals with the required skills and knowledge.

The state of current research on mental health and trauma in DHH adults
Since 1999, studies of mental health and disorders in DHH individuals seem to have improved methodically, especially with regard to assessment procedures and instruments. However, selection bias, lack of representative samples, and unmatched comparison samples still preclude firm conclusions regarding the prevalence and distribution of psychiatric symptoms and disorders in the DHH population (Öhre et al., 2011).
Trauma, in both childhood and adulthood, is associated with poor physical and mental health, psychiatric disorders, and increased substance abuse in the general population, (e.g., Felitti & Anda, 2010; Larsson et al., 2013). However, there are few studies providing evidence of the frequency of traumatic experiences and the subjective impact of such experiences within either clinical or non-clinical DHH populations; therefore, it is important to investigate the prevalence and nature of traumatic events experienced by the clinical DHH population to understand the scope of this critical health issue. The reviewed studies of trauma in the adult DHH population include samples from different subgroups, and DHH adult psychiatric outpatients hardly feature in this research.

The review of current research revealed that there is a need for valid and reliable instruments for assessment of mental disorders and trauma in DHH individuals who use sign language as their preferred language. Furthermore, clinicians have to be thoroughly trained to use the instruments and have a firm command of the language and culture of signing DHH individuals (Wright & Reese, 2015).
The Present study

The present study includes both methodological and clinical aims. It first investigates whether a Norwegian sign language version of the MINI meets the psychometric standard for a structured diagnostic tool for assessing mental disorders in signing DHH individuals in the same manner as do other versions of the MINI in general populations. Second, the study examines background factors and past and current life stressors, specifically traumatic events, which may potentially influence the DHH individual’s mental health and disorders.

The sample comprised individuals with different degrees of hearing loss, different social backgrounds, different proficiency in signed and spoken language, and different etiologies of hearing loss or deafness.

Because one of the main aims was to investigate the role of several background factors in the development of mental disorders, there was a need to expand the regular clinical intake interview to include questions about background factors and life events that may have affected the patient’s psychological vulnerability, such as cause and age at onset of the hearing loss, present preferred language and mode of communication, family communication in childhood, and educational background.

The existing research has mainly focused on the assessment, prevalence, treatment and prevention of mental disorders in the signing DHH population. Corresponding research and knowledge about the DHH population who use spoken language is scarce (Leigh, 2010), but the study of Fellinger and colleagues (2007) may indicate that more deaf people who use sign language than hard of hearing people who use spoken language are satisfied with their social lives. The present study therefore differentiates between linguistic subgroups of the total DHH population with congenital and childhood hearing loss and deafness in order to gain knowledge about the vast, but often overlooked group of individuals in this population who use spoken language.

The present study is an exploratory study of a DHH clinical population with mental disorders, specifically of patients who were consecutively referred to two specialized mental health outpatient services for the DHH population. Before initiating the clinical study, we had to improve the methodology; therefore, a qualified selection of standardized assessment instruments was translated into sign language and used by mental health professionals with extensive knowledge of the patient population, in combination with expertise in psychology.
psychiatry and communication skills in the patients’ preferred languages and modes of communication.

The overall aims
The aim of the validation study was to investigate whether an NSL version of the MINI functions in the same manner with DHH patients who use NSL as do other versions of the MINI with patients from the general population. (Paper 1)

The aim of the first clinical study was to compare the distribution of mental symptoms and disorders, and demographic characteristics in DHH patients who use NSL and DHH patients using spoken language who were referred for assessment and treatment to specialized psychiatric outpatient services for the DHH population. More specifically, the following factors were compared between the linguistic groups: demographic characteristics, main mental disorders, symptom intensity of mental disorders, psychiatric and medical comorbidity, and levels of general functioning and distress. (Paper 2)

The aim of the second clinical study was to investigate the prevalence of traumatic events and the subsequent traumatization in adults referred to specialized psychiatric outpatient units for DHH patients, and the associations between these experiences, mental distress, and demographic characteristics of the sample. (Paper 3)

The research questions
1. Will the Norwegian Sign Language version of the Mini International Neuropsychiatric Interview (MINI) function in a similar manner as with patients using spoken language when assessing mental disorders in signing DHH adults? (Paper 1)
2. Are there differences in demographic characteristics, main mental disorders, psychiatric and medical comorbidity, symptom intensity of mental disorders, and in levels of functioning and distress between patients using Norwegian sign language and patients speaking Norwegian? (Paper 2)
3. What is the prevalence of different types of potentially traumatic events and the subsequent impact reported by DHH adult psychiatric outpatients who are referred for assessment and treatment of mental disorders, and does the prevalence differ between patients in subgroups related to sex, hearing loss, age at onset of hearing loss, language preference, educational setting, and communicative skills of childhood caregivers? (Paper 3)
4. What is the prevalence and impact of trauma in patients who reported events in childhood only, adulthood only, and in both childhood and adulthood, and is there any significant association between age at first trauma and age at onset of mental disorder, and between age at first trauma and the patients’ symptoms of mental distress and disorder? (Paper 3)

**Methods**

**Design**

The study includes investigations of the psychometric properties of a Norwegian sign language version of the MINI and a study of consecutively referred DHH adult patients’ mental disorders and experiences of potentially traumatic events and their impact.

**Participants**

All adult patients consecutively referred to the specialized services for DHH patients (the National Unit for Mental Health and Hearing Impairment, Oslo University Hospital, and the Regional Centre for Mental Health and Hearing Impairment, St. Olav’s Hospital, Trondheim) were invited to participate in the study. Participants were recruited from January 1, 2010, through June 30, 2011.

The exclusion criteria were age below 18 years, dual sensory loss (deaf-blindness) requiring tactile communication, referral for reasons other than assessment and treatment of mental disorders, and acute and severe psychiatric or somatic illness. Due to the exclusion criteria, the study sample mainly comprises patients with non-psychotic disorders.

One hundred and twenty-six DHH adults were referred to the two specialized mental health outpatient units during the inclusion period. Seventeen patients did not meet the inclusion criteria, and 10 individuals did not attend their appointments. Ninety-nine patients met the participant criteria and were asked to participate. Fifteen patients declined and 84 consented to participate, see Figure 1.
Sample characteristics
Fifty-six female and 28 male patients participated in the study. Table 3 shows the basic demographic characteristics of the participants. The mean age was 38.0 years ($SD = 14.6$, range 18–83 years). Ten of the patients had completed primary school, 46 had a high school education, 22 patients held a lower university degree, and six had a higher university degree. Forty patients were single, 36 were married or cohabiting, and eight were divorced, separated or widowed.

Table 4 shows demographic variables related to hearing loss. The majority of the sample ($n = 76; 91\%$) became deaf or hard of hearing prior to six years of age. Forty patients (48\%) use NSL, and 44 (52\%) speak Norwegian with or without sign support. In the sample, language preference is not decided by the degree of hearing loss only. There is no automaticity in deaf patients being signers and hard of hearing patients using spoken language. Language preference does not strictly adhere to the degree of hearing loss, although to a large
extent there is an overlap: 87% of the hard of hearing patients use spoken language with or without sign support, and 76% of the deaf patients use NSL.

Table 3  General demographic characteristic, N = 84

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of female participants</td>
<td>56</td>
<td>(66.7)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>40</td>
<td>(47.6)</td>
</tr>
<tr>
<td>Married/cohabiting, boyfriend/girlfriend</td>
<td>36</td>
<td>(42.9)</td>
</tr>
<tr>
<td>Divorced, separated or widowed</td>
<td>8</td>
<td>(9.5 )</td>
</tr>
<tr>
<td>Level of education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>10</td>
<td>(11.9)</td>
</tr>
<tr>
<td>High school and equivalent</td>
<td>46</td>
<td>(54.8)</td>
</tr>
<tr>
<td>University, lower degree</td>
<td>22</td>
<td>(26.2)</td>
</tr>
<tr>
<td>University, higher degree</td>
<td>6</td>
<td>(7.1 )</td>
</tr>
<tr>
<td>Source of income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paid work and study loans</td>
<td>32</td>
<td>(38.1)</td>
</tr>
<tr>
<td>Social welfare and pension</td>
<td>52</td>
<td>(61.9)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>European/Caucasian</td>
<td>77</td>
<td>(91.7)</td>
</tr>
<tr>
<td>Asian</td>
<td>7</td>
<td>(8.3 )</td>
</tr>
<tr>
<td>Age at present assessment:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M = 38.0, SD = 14.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at onset of mental disorder:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M = 24.6, SD = 15.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Audiograms were received from 42 of the patients (50%), and physicians’ diagnoses of deafness and hearing loss from 31 patients (37%). Eleven patients (13%) did not provide information on hearing status. Of these 11 patients, nine had prelingual hearing loss, were signers and had attended schools for DHH children; they spoke of themselves as deaf. Two had attended regular schools and used spoken language, one with and the other without sign support.
Table 4  
Demographic variables related to hearing loss, N = 84

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of hearing loss(^a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard of hearing ≤80 dB</td>
<td>38</td>
<td>(45.2)</td>
</tr>
<tr>
<td>Profoundly hard of hearing/deaf &gt;80 dB</td>
<td>46</td>
<td>(54.8)</td>
</tr>
<tr>
<td>Time of hearing loss onset</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before 6 years of age</td>
<td>72</td>
<td>(85.7)</td>
</tr>
<tr>
<td>After 6 years of age</td>
<td>8</td>
<td>(9.5)</td>
</tr>
<tr>
<td>Missing information</td>
<td>4</td>
<td>(4.8)</td>
</tr>
<tr>
<td>Etiology of hearing loss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infection in pregnancy</td>
<td>7</td>
<td>(8.3)</td>
</tr>
<tr>
<td>Perinatal</td>
<td>7</td>
<td>(8.3)</td>
</tr>
<tr>
<td>Meningitis/infection in childhood</td>
<td>12</td>
<td>(14.3)</td>
</tr>
<tr>
<td>Usher syndrome I &amp; II</td>
<td>6</td>
<td>(7.1)</td>
</tr>
<tr>
<td>Other genetic/hereditary</td>
<td>26</td>
<td>(31.0)</td>
</tr>
<tr>
<td>Injury</td>
<td>4</td>
<td>(4.8)</td>
</tr>
<tr>
<td>Unknown to patient</td>
<td>20</td>
<td>(23.8)</td>
</tr>
<tr>
<td>Information missing</td>
<td>2</td>
<td>(2.4)</td>
</tr>
<tr>
<td>Hearing loss in the family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>29</td>
<td>(34.5)</td>
</tr>
<tr>
<td>No</td>
<td>50</td>
<td>(59.5)</td>
</tr>
<tr>
<td>Information missing</td>
<td>5</td>
<td>(6.0)</td>
</tr>
<tr>
<td>Preferred language and mode of communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norwegian sign language</td>
<td>40</td>
<td>(47.6)</td>
</tr>
<tr>
<td>Spoken Norwegian</td>
<td>26</td>
<td>(31.0)</td>
</tr>
<tr>
<td>Spoken Norwegian with sign support</td>
<td>18</td>
<td>(21.4)</td>
</tr>
<tr>
<td>Family’s communication with patient in childhood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norwegian sign language</td>
<td>7</td>
<td>(8.3)</td>
</tr>
<tr>
<td>Spoken Norwegian</td>
<td>52</td>
<td>(61.9)</td>
</tr>
<tr>
<td>Spoken Norwegian with sign support</td>
<td>25</td>
<td>(29.8)</td>
</tr>
<tr>
<td>Family’s language with patient in childhood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same</td>
<td>33</td>
<td>(39.3)</td>
</tr>
<tr>
<td>Different</td>
<td>51</td>
<td>(60.7)</td>
</tr>
<tr>
<td>Educational setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mainstream school</td>
<td>42</td>
<td>(50.0)</td>
</tr>
<tr>
<td>School for DHH children</td>
<td>42</td>
<td>(50.0)</td>
</tr>
<tr>
<td>Main childhood residence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family home</td>
<td>52</td>
<td>(61.9)</td>
</tr>
<tr>
<td>Residential school</td>
<td>32</td>
<td>(38.1)</td>
</tr>
</tbody>
</table>

Notes
\(^a\)As defined by the World Health Organization
DHH = Deaf and hard of hearing
For the purpose of statistical analyses and comparisons, the participants in the study were divided into subgroups according to various characteristics: gender, age at onset of hearing loss, language preference (signed or spoken), childhood home (family home or residential school), or the severity of their hearing loss – hard of hearing participants with an average hearing loss in the better hearing ear below or at 80dB and deaf participants with an average hearing loss in the better hearing ear at or above 81dB (WHO, 2015).

Those patients who did not provide audiograms were allocated to the deaf or hard of hearing subgroup based on the other personal information given: first and foremost, the person’s presentation of himself/herself as deaf or hard of hearing, supplemented by information regarding their preferred language in childhood and adulthood, and their educational background (mainstreamed, in class for hard of hearing children, or in school for deaf children).

Thirty-three patients (39%) reported that their families of origin had used the same mode of language and communication that they preferred as adults. However, this percentage was different for different language modes. Six (15%) of the 40 patients who use sign language and 27 (61%) of the 44 patients who use spoken language reported that their families of origin had used the same language and mode of communication that they preferred as adults.

Different sample sizes in the three parts of the study
The sample ($N = 41$) in the validation study of the MINI comprised all the patients who were consecutively included in the study throughout the first twelve months who use NSL ($n = 29$) and sign supported speech ($n = 12$). The latter group was included because these patients could not have been reliably assessed without the sign language version of the MINI; communication with the therapists broke down without the signs supporting the spoken communication. We therefore decided that the assessments of this subgroup of patients were eligible for inclusion in the validation analyses. The inclusion period was limited to the first twelve months of the study period due to the resource-consuming design of the validation study.

In the last six months of the study, the assessment procedures were simplified in that each patient met with only one team of therapists who conducted all assessments. This design is not appropriate for a validation study, therefore the diagnoses of these patients ($n = 43$) were not included in the analyses of validity and reliability.
The sample \((N = 76)\) in the study that compared demographics, mental disorders, and symptom levels of mental distress between patients who use NSL and patients who use spoken language comprised the total number of patients with childhood hearing loss who were consecutively included in the entire study period from January 1, 2010, to June 30, 2011. The sample \((N = 62)\) in the study of traumatization comprised all patients who completed the Traumatic Experiences Checklist (TEC) (Nijenhuis et al., 2002) throughout the study period. However, four deaf patients ended the contact before all assessments were completed and five deaf patients were considered by their clinicians not to have the cognitive or language skills required to answer the questions, even with assistance. The latter exclusion criterion was also applied in the original study on the psychometric properties of the TEC, and in Schild and Dalenberg’s (2012) study of deaf adults. Of the 75 eligible patients, 13 (nine deaf and four hard of hearing) did not return the TEC. Sixty-two (83\%) of the 75 eligible participants completed the TEC and were included in the study.

**Assessment**

The participating professionals were experienced mental health specialists skilled in sign language and familiar with the cultural and psychosocial aspects relevant to psychiatric assessment of DHH patients. The assessments applied were the ordinary diagnostic assessments at intake, which included the MINI, the Symptom Check List-25 (SCL-25), and the Global Assessment of Functioning (GAF) scale. No sign language versions of the MINI, the TEC or the SCL-25 had been reported prior to the present study. The results were documented in case notes from which personal identifiers had been removed.

**The assessment instruments**

**Clinical interview** The standard clinical intake interview in use at the Clinic of Mental Health and Addiction, University of Oslo, was applied and extended to include questions about background factors and life events that may have affected the patient’s psychological vulnerability. These questions included etiology and age at onset of hearing loss, primary language and communication mode, childhood communication environment, educational setting, and experiences related to growing up with severe or profound hearing loss or life experiences related to the loss of hearing. Information about hearing status, preferably an audiogram, was requested from the participants. The intake interview was used as expert opinion in the validation of the MINI.
The Mini International Neuropsychiatric Interview (MINI) The MINI (Lecrubier et al., 1997; Sheehan et al., 1997; Sheehan et al., 1998) includes 23 disorders from the tenth revision of the International Classification of Diseases and Related Health Problems (World Health Organization, 1993) and from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (American Psychiatric Association, 1994). For written and spoken language, excellent inter-rater and test–retest reliabilities have been reported for the English and French versions (Shrout, Spitzer, & Fleiss, 1987), and good to very good concurrent validities relative to the Composite International Diagnostic Interview and the Structured Clinical Interview for Diagnostic and Statistical Manual (Lecrubier et al., 1997; Sheehan et al., 1997). In the present study, the MINI 5.0.0 was used, either in spoken Norwegian language, with or without sign support, or in NSL.

The MINI was originally developed to meet the need for a brief and reliable structured diagnostic interview in clinical practice as well as in research (Lecrubier et al., 1997; Sheehan et al., 1997). In clinical practice, the MINI is considered a supplement to, and not a substitution for, regular diagnostic intake interviews. It is a structured evaluation of most of the major psychiatric conditions (Lecrubier et al., 1997; Sheehan et al., 1997), and was therefore selected for translation into NSL.

The Symptom Check List-25 (SCL-25) The SCL-25 (Derogatis et al., 1974) is a widely used self-report instrument measuring symptoms of anxiety and depression. The SCL-25 includes 25 items scored on a four-point scale ranging from 1 (not bothered) to 4 (extremely bothered). The average item score (calculated by dividing the total score by the number of items answered) is often used as a measure of emotional distress. When presented in written and spoken languages, a cut-off of 1.75 is recommended as a threshold for the diagnosis of a mental disorder (Nettelbladt, Hansson, Stefansson, Borgquist, & Norsdström, 1993; Sandanger et al., 1998; Winokur, Winokur, Rickels, & Cox, 1984).

The Traumatic Experiences Checklist (TEC) The TEC (Nijenhuis et al., 2002) is a comprehensive self-report trauma questionnaire that assesses exposure to a broad range of potentially traumatic events and their impact on an individual across the lifespan. It includes 29 questions about emotional neglect and abuse, physical abuse, bodily threat from another person, intense pain, and sexual harassment and abuse. Presence of the event, age at onset, age at possible recurrence, duration, and the subjectively experienced impact of the event are
assessed. We measured the number of different types of traumatic events (“TEC score”) and the impact of those events (“impact score”). The impact scores range from 1 (none) to 5 (an extreme amount). The TEC measures heterogeneous traumatic experiences; in this study, such experiences are classified as follows: relational versus non-relational, intentional versus non-intentional and single events versus lasting or recurring events. Questions about relational abuse are categorized according to the perpetrator’s relationship to the victim.

**The Global Assessment of Functioning (GAF) scale** The GAF scale (Endicott, Spitzer, Fleiss, & Cohen, 1976) is a measure of overall impairment caused by mental factors. It is a 100-point scale on which a higher score indicates better functioning. The score is based on all available information about a patient’s psychiatric symptoms and social and occupational levels. The GAF split version (GAF symptom = GAF S, GAF functioning = GAF F), which was used in the present study, is recommended for research purposes (Pedersen & Karterud, 2012). In the split version, the symptoms and functions are rated separately (Pedersen, Hagtvet, & Karterud, 2007). The GAF was scored using internationally established criteria used at the Oslo University Hospital; each patient’s case was discussed and scored by clinical teams who had attended training courses at the Oslo University Hospital, or at St. Olav’s Hospital, Trondheim.

**Translation procedures**

The translations of MINI, TEC and SCL-25 were performed in accordance with internationally acknowledged translation procedures for diagnostic instruments (Bhui, Mohamud, Warfa, Craig, & Stansfeld, 2003; John & Benet-Martinez, 2000; Maneesriwongul & Dixon, 2004) and with recommended procedures for translating written and spoken material into sign language (Cornes, Rohan, Napier, & Rey, 2006; Steinberg et al., 1998).

A bimodal, bilingual team of hearing and deaf clinicians and researchers translated each item of the assessment instruments into sign language. When agreement was reached about all items of the signed version, it was video recorded and back-translated into written Norwegian by deaf and hearing bimodal, bilingual professionals not familiar with the original text. The research team compared the back-translations to the original written text. In instances where back-translated items did not correspond to the content and intent of the original item, the items were discussed and rephrased. Consensus regarding the original text and back-translations was obtained before any item was included in the final version. This
final version was then video recorded and used to train signing therapists on correct presentation of questions using uniform NSL expressions.

Procedure
The patients were assessed at the two hospitals. At the beginning of the first assessment session, the patient’s preferred language and mode of communication were ascertained before he or she was informed about the study. Written consent was obtained from the patients who decided to participate. Throughout the study, communication between patients and professionals was in each patient’s preferred language and communication mode: mainly spoken Norwegian, NSL, or sign-supported speech. Typed interpretation was used in the assessment of one patient, and in the assessment of a patient from a foreign country an interpreter was used.

All therapists were knowledgeable about deafness, deaf culture, and the potential psychosocial consequences of hearing loss. Moreover, they all had extensive clinical experience with DHH patients and were skilled in NSL and the various communication modes used by the patients. To reduce the risk of differences in signed utterances, all the professionals were instructed and trained to pose the assessment instrument questions according to the filmed NSL versions. However, differences in vocabulary and NSL skills among the patients sometimes called for phrases to be adapted to enable the patient to comprehend what was being asked. All diagnostic assessment sessions were video recorded, except in the case of three patients who did not consent to recording.

The SCL-25 and TEC are self-report instruments usually completed individually by patients. Because some DHH patients may struggle to read written texts (Hendar & O’Neill, 2016; Holt, 1993; Marschark et al., 2011; Pollard & Barnett, 2009; Steinberg et al., 1998), the therapists asked all the patients to check carefully whether they understood the wording. They were also asked whether they preferred to fill in the questionnaires by themselves or to have the therapist pose the questions interview-style and then fill in the appropriate answer themselves. Some patients asked their therapist for this assessment to be conducted as an interview in NSL as they had difficulties reading the questions. Even if all clinicians were trained to pose the questions in uniform NSL utterances according to the translated NSL version, misunderstandings may have occurred (as could also happen when a patient reads a self-report questionnaire). A transcribed video recording of these interviews might have detected potential irregularities and provided the opportunity for clarifications; therefore this will be included in future studies.
**Procedure in the first 12 months**

Each participant was first seen by the team that would conduct the clinical intake interview (expert opinion). The MINI assessment was completed by another team consisting of a native-signing deaf therapist, who posed the questions to the patients, and either a psychiatrist or a specialized clinical psychologist, who guided the deaf co-therapist and the participant through the MINI interview and made the diagnostic decisions. Sometimes, the latter professional would also ask questions to obtain additional information. The two diagnostic teams received the referral information but did not share other information and were blind to each other’s diagnoses. The two assessments were scheduled with minimal time lag between them. All assessment sessions were video recorded, except those of three participants who did not want to be recorded.

To ensure that the clinical intake interviews were in fact appropriate to serve as expert opinion for validating the MINI, inter-rater reliability was computed. Eleven (27%) of the recorded clinical interviews were reassessed by a clinical psychologist who was familiar with the patient population and skilled in NSL. He received the referral information and made assessments based on the videotaped interviews, but was blind to the diagnoses given in the assessment. The same procedures were used to compute inter-rater reliability for eight (20%) of the MINI interviews. The patients were drawn randomly, but because the psychologist had to be blind to the person’s diagnoses, the same patient could not be reassessed twice. To prevent resampling, the patients whose intake interviews had been used for reassessment were excluded before the random subsample was drawn.

**Procedure in the last six months**

In the last six months of the study, the assessment procedures were simplified in that each patient met with only one team of therapists who conducted all assessments (clinical intake interview, MINI, TEC, SCL-25 and GAF). This design is not appropriate for a validation study, therefore the diagnoses of these patients \( n = 43 \) were not included in the analyses of validity and reliability.

**Statistical Analyses**

In the validation study of the NSL version of the MINI, IBM SPSS Statistics for Windows, Version 20 (IBM Corp., 2011) was used to analyze the data. Cohen’s kappa was calculated to
assess inter-rater reliability and to estimate the validity of the diagnoses assessed by the MINI (Paper 1).

In the clinical study (Papers 2 and 3) the statistical analyses included descriptive statistics, chi-square tests for comparisons of categorical data, independent samples t-tests to compare groups, Pearson product-moment correlation coefficients to examine associations in interval data, and two way between-groups analysis of variance to test for interaction. The internal consistency of the subscales in the checklists (TEC and SCL-25) was computed using Cronbach’s alpha (Papers 2 and 3).

The large number of analyses conducted in this study increases the probability of Type I error (Bakan, 1967). However, because the study was exploratory, we chose to present all results, instead of adjusting the alpha level, to avoid overlooking important trends. Therefore, we interpret marginally significant results with caution. The strength of the current findings was explored post hoc, and because of small subsample sizes, only results with effect sizes ≥ .7 would have had the power to detect differences between subgroups in the population of DHH psychiatric outpatients. In all statistical analyses, the significance level is two-tailed. IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., 2013) was used to analyze the data.

**Ethical considerations**

The Regional Committee for Medical and Health Research Ethics and the Norwegian Data Protection Authority approved the study. Written information was provided to eligible patients. To ensure patients’ understanding of their potential role in the study, professionals supplied additional information in the patient’s preferred language, i.e., NSL or spoken Norwegian. Written consent was obtained from those who decided to participate. The participants were informed that they could withdraw from the study at any time and have their video recordings erased without any consequences to their treatment. Appropriate support and counseling were available to any participant who experienced additional stress resulting from study participation.
Summary of papers and main findings

I: Psychometric properties of a sign language version of the Mini International Neuropsychiatric Interview (MINI)

The aim of the study
The aim of the study was to investigate whether an NSL version of the MINI functions in the same manner with DHH patients who use NSL as do other versions of the MINI with patients from the general population.

Background
There is a need for psychiatric assessment instruments that enable reliable diagnoses in persons with hearing loss who have sign language as their primary language. The objective of this study was to assess the validity of the NSL version of the MINI.

Methods
The MINI was translated into NSL. Forty-one signing patients consecutively referred to two specialized psychiatric units were assessed with a diagnostic interview performed by clinical experts and with the MINI. Inter-rater reliability was assessed with Cohen’s kappa and “observed agreement.”

Main results
There was 65% agreement between MINI diagnoses and clinical expert diagnoses. Kappa values indicated fair to moderate agreement, and observed agreement was above 76% for all diagnoses. The MINI diagnosed more comorbid conditions than did the clinical expert interview (mean diagnoses: 1.9 versus 1.2). Kappa values indicated moderate to substantial agreement, and “observed agreement” was 88%. The Norwegian Sign Language version of MINI demonstrated adequate reliability and validity as a diagnostic instrument for assessing mental disorders in individuals who have NSL as their preferred language.

Conclusion
The kappa scores in the present validation of the NSL version of the MINI and the observed agreements with expert opinion do not differ substantially from those of other validation studies. The NSL version appears to be a reliable diagnostic interview for assessing mental disorders in signing persons, provided that it is used by professionals with appropriate sign language skills and knowledge about the patient group. The results of the present study therefore encourage translation of the MINI into other sign languages.
II: Mental disorders in deaf and hard of hearing adult outpatients, a comparison of linguistic subgroups

The aim of the study
The aim of the study was to compare the distribution of mental symptoms and disorders and demographic characteristics in DHH patients using NSL and those using spoken language who were referred for assessment and treatment to specialized psychiatric outpatient services for the DHH population. More specifically, the following factors were compared between the linguistic groups: demographic characteristics, main mental disorders, symptom intensity of mental disorders, psychiatric and medical comorbidity, and levels of general functioning and distress.

Background
DHH individuals who use signed language face different challenges and stressors compared to those who use spoken language, and accordingly, the profile of their mental problems may also be different. However, clinical studies of mental disorders in the DHH population have seldom differentiated between linguistic groups.

Methods
Forty signing and 36 Norwegian speaking patients were diagnosed with mental disorders (MINI) and assessed for daily life functioning and symptoms of mental distress (GAF and SCL-25). All assessment instruments were translated into Norwegian Sign Language for the assessment of signing participants.

Main results
More signing patients than patients using spoken language were deaf, did not share a common language with their childhood caregivers, and had attended schools for DHH children. More patients using spoken language than signing patients reported medical comorbidity, while the distribution of mental disorders, symptoms of anxiety and depression, and daily functioning did not differ significantly. Nearly half of the patients (47%) referred to the specialized mental health services for the DHH population use spoken language. When SCL-25 was administered in Norwegian and NSL, Cronbach’s alpha was .91 for the total score, .86 for the Anxiety subscale, and .87 for the Depression subscale.

Conclusion
In this sample of patients referred to specialized mental health services for the DHH population, there were clinical and demographic differences between patients using sign language and patients using spoken language: Somatic complaints and greater perceived social isolation may indicate higher stress levels in DHH patients using spoken language than
in those using sign language. Apart from these findings, the level of mental distress and daily functioning did not differ significantly between the groups; neither did the distribution of mental disorders.

III: Traumatization in deaf and hard of hearing adult psychiatric outpatients

The aim of the study

The aim of the study was to investigate the prevalence of traumatic events and the subsequent traumatization in adults referred to specialized psychiatric outpatient units for DHH patients, and the associations between these experiences, mental distress, and demographic characteristics of the sample.

Background

Deaf and hard of hearing individuals are at risk for experiencing traumatic events and such experiences are associated with symptoms of mental disorder. There is limited evidence regarding the frequency of traumatic experiences and the subjective impact of such experiences among DHH individuals with mental disorders.

Methods

Sixty-two patients were diagnosed with mental disorders and assessed for potential traumatic experiences in their preferred language and mode of communication using the Traumatic Experiences Checklist (TEC). All assessment instruments were translated into Norwegian Sign Language for the assessment of patients who use sign language.

Main results

All patients reported traumatic events, with a mean of 6.2 different types; 85% reported one or more high-impact traumatic experience not significantly associated with childhood residency, educational setting, preferred language or communicative competence of childhood caregivers. Patients who reported childhood trauma presented more severe symptoms of mental distress, and were significantly younger, both at onset of mental disorder and at the time of the present assessment, than patients who had experienced trauma in adult life only. The types and impact of traumatic events reported in adulthood were similar to those reported in childhood. The pattern of lifetime trauma differed between male and female patients. Significantly more female than male patients had experienced trauma in childhood and reported more events of emotional neglect. The frequency and impact of traumas were significantly related to symptoms of anxiety in women, but not in men. Female patients were more often victims of neglect and maltreatment by close family members, whereas male patients were more at risk for maltreatment by persons outside the family. When Norwegian and NSL versions of the
TEC were administered in the present study, Cronbach’s alpha was .74 for the total score, .74 for the Relational Traumatic Events subscale, and .52 for the Non-Relational Traumatic Events subscale.

**Conclusion**

The results suggest that traumatic experiences are common among DHH psychiatric outpatients and that these experiences may contribute to mental distress. Traumatization is characterized by subjectively reported experiences of high-impact trauma, and not by the prevalence of potentially traumatic events alone. Most of the DHH patients reported having experienced high-impact traumatic events. The different patterns of traumatization found in female and male patients were similar to patterns found in clinical samples from the general population, suggesting similar influences on the course of mental disorder. The lack of significant associations between frequency of trauma and school setting, and between communicative competence of childhood caregivers and degree of traumatization, may reflect changes in both parent knowledge of signing and deaf culture, and the quality of school environments, suggesting that these factors may be less prominent today than in the populations sampled in earlier studies.
Discussion

The study compares two groups for whom reduced hearing has been a lifelong issue and part of their identity. The results show differences and similarities between DHH patients who use sign language and those who use spoken language.

Mental disorders in the two language groups

The mental disorders most frequently diagnosed in both groups were mood disorders and neurotic, somatoform and stress-related disorders, followed by alcohol- and drug-induced disorders and personality disorders. There were no differences between the two linguistic groups with regard to mental disorders, prevalence of psychiatric comorbidity, level of general functioning and symptom level of mental distress.

We might have expected that the general demographic characteristics would have differed between patients using sign language and patients using spoken language, as characteristics related to hearing loss differed significantly: Compared to patients who use sign language, more patients who use spoken language had less severe hearing loss, grew up in the family home, had a shared language with their caregivers in childhood and had attended the local school. These circumstances have proved to contribute positively to DHH children’s cognitive, emotional and psychosocial development (e.g., Brown & Cornes, 2015; Jamieson, 2010; Marschark, 1997; Theunissen, Rieffe, Kowuenberg, Soede, Briaire, & Frijns, 2011; Wallis, et al., 2004). Consequently, we might have expected participants who use spoken language to have had higher levels of education, and, more often, paid jobs. However, there were no differences between the language groups when it came to general demographic characteristics. It is unknown whether or not the two linguistic subsamples represent their populations in similar ways, and if potential differences in representation may have contributed to the findings of the study. Moreover, it is not known whether or not these patients who use spoken language are more or less severely mentally ill than those from the same population who seek psychiatric treatment in other (general) mental health services. However, Fellinger and associates (2007) found that hard of hearing people who use spoken language report having unfulfilling social lives more often than do signing deaf people.

Some studies of mental disorders in DHH outpatients that compared clinical DHH samples with clinical hearing samples have found that the two groups have different
demographic profiles (de Bruin & de Graaf, 2004/2005; Pollard, 1994) and somewhat different diagnostic profiles (Appleford, 2003; Diaz et al., 2013; Pollard, 1994). The clinical differences have been attributed to different factors such as referral patterns (Appleford, 2003), restricted access to health information and mental health services for the DHH population (Diaz et al., 2013; Pollard, 1994), and insufficient language and assessment skills of therapists (Pollard, 1994). Other researchers have attributed the differences to specific types of etiology (e.g., intrauterine infections and childhood meningitis) which may cause disorders in addition to the hearing loss (Diaz et al., 2013; Pollard, 1994), and to possible communication breakdown between patients and therapists because of the therapists’ lack of communication skills and patients’ non-fluent language (Diaz et al., 2013).

The present study did not include a comparison sample, but its results were compared with those of Ose, Ådnanes, and Pettersen’s Norwegian (2014) cross-sectional study of adult psychiatric outpatients from the general population (N = 23,167, median age 35 years, 63% female, 42% single, 40% paid work and study loans). The demographic characteristics of the compared samples were similar, and apart from the prevalence of psychotic disorders (excluded in the present study), the distribution of psychiatric diagnoses was similar in the two samples. Thus, the present findings differ from those of previous studies which state that the distribution of psychiatric diagnoses in DHH adults who are referred to specialized outpatient services differs from that of hearing patients referred to general outpatient services (Appleford, 2003; Diaz et al., 2013; Pollard, 1994). The difference between the present findings and those of previous studies of DHH outpatients (Appleford, 2003; Diaz et al., 2013; Pollard, 1994) may be attributable to differences in the referral bases of the patients, which leads to differences in sample-composition that are then reflected in the differences in the demographic characteristics of the samples.

Significantly more patients who use spoken language than patients who use sign language reported medical comorbid conditions. This finding cannot be explained by the etiology of hearing loss, as the etiology did not differ between the linguistic groups. A plausible interpretation is that the higher prevalence of somatic complaints was related to stress in adult life. DHH adults who use spoken language typically work and socialize within the majority hearing society and are expected to meet the same standards as the hearing population. As a result, they likely spend a lot of physical and mental energy to be able to follow spoken conversations and make sure that they obtain the information they need, both at work and in other social settings. Over time, physical stress reactions may result in medical disorders (e.g., headache, musculoskeletal complaints) (Dalton, 2011; Ursin & Eriksen, 2007;
Williams, Falkum, & Martinsen, 2015.) This interpretation is supported by the fact that somatic complaints were associated with anxiety.

Another possible reason for the difference in medical comorbidity is that the two linguistic groups may not have similar access to health information. This may influence their answers and responses in the assessment situation, especially when filling in self-report forms where the answer alternatives are presented as scales. It has been documented that the adult DHH signing population has less knowledge about mental and medical health issues compared to the general population (Kuenburg, Fellinger, & Fellinger, 2016; Pollard & Barnett, 2009). This may impact both on their recognition of health issues, and their reports of symptoms of potential disorders.

More patients who use spoken language reported social isolation compared to patients who use sign language, the difference only approached statistical significance. DHH individuals who use spoken language may actively isolate themselves to avoid negative social experiences. Alternatively, isolation may be a result of misunderstandings or social exclusion. Most signing DHH adults socialize and culturally identify with the Deaf community; whereas DHH adults who use spoken language may feel that they belong neither to the Deaf nor the “hearing” society. Linguistically, they may appear integrated into the hearing majority society but they still struggle socially, and fear exclusion (Herheim, 2015; Williams et al., 2015). A similar result was reported by Fellinger and associates (2009) who found a difference between the two linguistic groups concerning peer-group inclusion and sense of belonging to a community. In DHH individuals who are signers, peer group membership may have functioned as a protective factor against experiencing social isolation, a hypothesis that should be further examined.

**Traumatic experiences and their subsequent impact**

High-impact traumatic experiences were frequently reported in this clinical DHH sample with the majority of the sample reporting one or more. These findings are in accordance with the results of the only prior clinical trauma study of DHH outpatients (Johnston-McCabe et al., 2011) and with general outpatient samples (Felitti & Anda, 2010; Giller, 1999; Larsson et al., 2013; Nijenhuis et al., 2002). This may indicate that the prevalence of traumatic experiences is not fundamentally different in deaf, hard of hearing, and normally hearing adult psychiatric outpatients.
The types and impact of traumatic events reported in childhood and adulthood were similar. However, trauma at different stages of life proved to have different consequences. Patients who had experienced traumatic events in childhood presented more severe symptoms of mental distress than did patients who had experienced trauma in adult life only. Moreover, patients who had experienced childhood trauma were significantly younger at the onset of mental disorder, indicating that trauma early in life may be associated with more severe symptoms and earlier onset of mental disorder.

All the patients reported at least one traumatic event and the average number was similar to that reported by Nijenhuis and associates (2002) and by Schild and Dalenberg (2012) in their study of a general deaf population sample. Unfortunately, there is a lack of studies on the prevalence and impact of trauma in both clinical and non-clinical DHH adult populations. A more detailed comparison between the present study and that of Schild and Dalenberg (2012) was not possible as the latter used different assessment instruments and presented only partial information on the mental status of their participants.

In the present study, the majority of patients in all diagnostic categories reported high-impact traumatic experiences, indicating that reactions to traumatic experiences are not limited to the symptoms typically seen in PTSD. The result is consistent with previous findings and indicates that abuse in both childhood and adulthood is associated with a broad range of mental disorders (Bulik, Prescott, & Kendler, 2001; Jonas et al., 2011). The findings may reflect that when dealing with the psychological consequences of trauma, individuals try a number of coping strategies, some of which may prove dysfunctional and produce symptoms of mental disorder.

As hearing loss represents a biological vulnerability throughout life, the study assessed trauma both in childhood and adulthood. Eleven percent of the patients reported traumatic events in childhood only, 60% reported traumatic events both in childhood and adulthood, and 29% reported traumatic events in adult life only. Thus the majority of the patients (71%) had experienced traumatic events in childhood, and an even higher percentage (89%) reported traumatic events in adult life.

Relational childhood trauma may have serious negative effects on an individual’s emotional, psychological, and cognitive development. It may cause insecure attachment, unstable interpersonal relationships and low self-esteem (Anstorp et al., 2006; Janssen et al., 2004; Kernhof et al., 2008; Shelvin et al., 2008). Trauma in adult life may not have an equally strong impact on the personality structure and functioning of the individual.
The patients who reported traumatic events in adulthood only reported almost equal numbers of types of events as those reporting trauma experiences both in childhood and adulthood, indicating that trauma in adult life is not restricted to certain types of events, but includes events that are almost as diverse as traumatic events in childhood. Also, the mean trauma impact score of patients who reported traumatic events in adulthood only was similar to that of patients who had experienced traumatic events both in childhood and adulthood, suggesting that traumatic events in adult life are experienced as strongly by the individual as are traumatic events in childhood.

The most common types of traumatic events were of a relational character: emotional neglect and emotional abuse by close family members and family problems in childhood. This is in line with previous research findings, and suggests that interpersonal traumatic experiences impact the most on an individual’s mental health. Sullivan and Knutson (1998) found a high prevalence of neglect and emotional abuse among DHH children, and Burnash and associates (2010) found emotional neglect and emotional abuse in childhood to be more prevalent in DHH students than in hearing students. Moreover, in the clinical study by Johnston-McCabe and associates (2011), the majority of the DHH patients (71%) reported that they had been exposed to emotionally and psychologically abusive behavior in adult life. Thus, a high prevalence of emotional neglect and abuse is found in various subgroups of the DHH population.

Retrospective assessment of trauma always involves some degree of inaccuracy because of the processes of encoding, storing, and retrieving memories, the presence of defense mechanisms, and a person’s need to appear socially acceptable (Spinhoven, Nijenhuis, & Van Dyck, 1999). As a result, traumatic events may have been subject to recall bias, resulting in over-reporting or underreporting of trauma. Also, the patients’ overall mental state, which, for most patients, included depression and anxiety, may have influenced the severity of impact scores. However, there is no reason to believe that these mechanisms affect the results of research with DHH samples and samples from the general population in different ways.

**Trauma and characteristics related to hearing loss**

Characteristics related to hearing loss were not associated with differences in frequency and impact of traumatic events; the prevalence and impact of traumatic events in patients with prelingual hearing loss did not differ from those of patients with postlingual hearing loss.
Furthermore, the spectrum of traumatic events was not significantly different in deaf and hard of hearing patients. The same was true of the scores of patients who use sign language compared to those of patients who use spoken language. These findings should be interpreted with caution as the subsamples were small and there were overlaps between the subgroups. The results are, however, in line with previous findings (Kouwenberg et al., 2012; Schild & Dalenberg, 2012) and may indicate that hearing loss of any degree is associated with a risk of experiencing traumatic events, regardless of whether the hearing loss is congenital or acquired, the language used spoken or signed, and whether the individual is mentally healthy or ill. However, evidence is limited and further research is needed at this point.

The percentage of participants who reported traumatic events in childhood was the same among those who had lived at home and those who attended a residential school. Moreover, the patients who had attended regular schools and schools for DHH children reported similar numbers of traumatic events in childhood, including physical and sexual abuse. These findings differ from those of previous studies which reported that, for DHH children, residential school settings represent a higher risk of neglect, maltreatment, and abuse than the family home (e.g., Kvam, 2004; Sullivan & Knutson, 1998; Vernon & Miller, 2002). Here, too, the present results should be interpreted with caution, as the subsamples were small. The findings seem to reflect that both living at home and living in residential schools was challenging for the DHH patients, but in different ways. Those who mainly lived at home had the advantage of stable living conditions, but they may have had communicative and social challenges that went unnoticed by their parents and teachers (Dalton, 2011; Fellinger et al., 2008; Herheim, 2015). Those who attended residential schools had to leave home relatively early, often without their (hearing) parents being able to explain where they were going or why, and several patients described this experience as traumatic. The conditions in the residential schools may not have been optimal, but the children and some of the adults shared a common language. Within this communicative environment, the children could establish new attachments both to the staff and to other DHH children. In this way, being part of a larger language community and sharing experiences with other pupils may have compensated for the negative aspects of an institutionalized childhood compared with a family life. The advantages and disadvantages of family life and residential school in childhood may have balanced each other out, and this may explain why only marginal differences were found between the trauma experiences of the two groups.

An additional explanation for the present findings that deviate from previous research may be found in the societal and educational changes that have taken place in the period
between this and previous studies. These changes have generally led to more similar childhood and educational conditions for children in schools for DHH children and those in regular schools. Moreover, differences in the organization of health and welfare services in the countries where the studies were conducted and methodological differences between the studies may have contributed to the findings of the present study being different from those of studies conducted in other countries.

The percentage of participants who reported that their family had used the language and mode of communication that they preferred as adults differed significantly between the patients in the two language groups, showing that most of the patients who use signed language did not share the language with their parents in childhood, in contrast to the patients who use spoken language. Contrary to expectations, the prevalence and impact of traumatic events were not related to caregivers’ command of patients’ preferred language and mode of communication. This result may be related to attribution profiles. Several patients reported that because they knew that other DHH children had been exposed to similar events, they considered them to be normal childhood experiences, indicating that even if the child and the caregivers shared a common language, there was little exchange of information or communication of concerns about traumatic events. If the child attended a residential school, he or she may have had few opportunities for talking with his or her parents and consequently, for talking about such events. It is also possible that the DHH children had only partial experience with and understanding of the help and comfort that may be gained from talking to someone about traumatic experiences.

**Trauma in male and female DHH patients**

Significantly more female (80%) than male (50%) patients had experienced trauma in childhood. In addition, more female than male patients reported traumatic events throughout the lifespan, although this difference only approached significance. The findings are in accordance with results from studies of both clinical and non-clinical hearing populations (e.g., Briere & Elliott, 2003; Nijenhuis et al., 2002), suggesting that the sex pattern is similar in general and DHH clinical populations. This finding is not, however, in line with the results of Kouwenberg and associates (2012) and Schild and Dalenberg (2012) who did not find sex differences. These studies included non-clinical DHH populations of differing ages, and the discrepancy may reflect sample differences.
In the present study, women reported more events of emotional neglect than men, and the impact scores for emotional neglect were significantly higher among female patients than among male patients. The impact scores of emotional abuse and sexual harassment were also higher among female patients, suggesting that emotional reactions to such experiences differ by sex. The frequency and impact of traumatic events were significantly related to symptoms of anxiety in women, but not in men. Similar sex differences were reported by Nijenhuis and associates (2002) for psychiatric patients from the general population in the Netherlands.

Female patients were more often victims of neglect and maltreatment by close family members, whereas male patients were more at risk for maltreatment by persons outside the family. This is consistent with research on general population samples (e.g., Hjemmen et al., 2002) and supports the conclusion that the sex differences found in these DHH patients parallel those of patients from the general population.

The two language subgroups of the sample

A notable, and somewhat unexpected, finding was that half of the patients (52%) who participated in this study (N = 84) use spoken language and 45% are hard of hearing. The finding was unexpected, as the Norwegian specialized mental health services for the DHH population were originally established to serve the signing deaf and deaf-blind population with severe psychiatric disorders (Statens Helseblock, 2001), and earlier studies have found that hard of hearing people do not frequent the specialized mental health services for the DHH population (de Bruin & de Graaf, 2004/2005; Diaz et al., 2013). However, referral of hard of hearing patients who use spoken language to the specialized services has recently increased in Norway. This may reflect the findings of Fellinger and associates (2007), who found that hard of hearing people, who use spoken language, were disappointed with their social life more often than were signing deaf people. The reasons for this change in referral practice have not been explored. They are likely related to the ongoing dissemination of information about the services, and to the obvious advantage of being treated by professionals with adequate clinical and communicative competence.

Assessment with the NSL version of the MINI

The study examined how the NSL version of the MINI would function when assessing mental disorders in signing DHH adults. We found the NSL version of the MINI to function as well
as other MINI versions. The NSL version of the MINI proved to be reliable and valid as a diagnostic instrument for assessing mental disorders in individuals who have NSL as their preferred language, when used by professionals with appropriate skills and knowledge and with adequate time.

The MINI was developed to meet the need for a structured assessment instrument that could be administered in the minimal amount of time. In the present study, the average MINI assessment required almost three times the time estimated by Sheehan and associates (1998). There were several reasons for this: The psychologists and psychiatrist were skilled signers, but not deaf native signers. Therefore, to ensure fluent communication and mutual understanding, the interviews were conducted by two therapists (one hearing and one deaf); this method required collaboration and coordination, which may account for part of the extra time used. Furthermore, as was pointed out by Black and Glickman (2006), many DHH patients with mental disorders do not have full mastery of sign language and may struggle to express themselves and to comprehend what is being communicated to them; this may lead to many repetitions. Finally, when using sign language, the interviewer cannot simultaneously take notes and communicate with the patient, and, consequently, the time needed to take notes will add to the total interview time (Jones et al., 2006). However, the main reason for including the MINI as an assessment instrument in the present study was not to reduce assessment time, but to improve consistency, as it proved to do.

**Methodological considerations**

Studies on the distribution of mental disorders in clinical samples are important because this distribution indicates treatment needs. However, both a comparison with clinical samples from the general population and interpretation of distribution data require knowledge about the referral base of the samples. The referral of DHH patients to mental health services (both general and specialized) may differ in several ways from the referral practices for patients from the general population. For example, a study by McClelland and associates (2001) indicated that in the UK, many DHH adults with mental disorders ranging from mild to severe are never referred to appropriate services. Several authors (Appleford, 2003; Connolly et al., 2006; McClelland et al., 2001; Werngren-Elgström et al., 2003) point to a likely under-referral of DHH individuals caused by hindrances in the referral chain, communication problems, and diagnostic shadowing.

The Norwegian specialized mental health services for the DHH population admit DHH patients whether they are signers or not. Approximately half of the present sample was
hard of hearing and half deaf. However, the hard of hearing and the deaf participants in this study may represent the total adult hard of hearing and deaf populations in different ways. Further studies are needed to better understand what proportion of the two populations are referred to the specialized services and the general mental health services, respectively, whether patients who are referred to the specialized services are more or less severely mentally ill than those seeking treatment elsewhere, and whether these patients differ systematically from other DHH psychiatric patients in other respects.

Some of the patients who were referred to the specialized psychiatric services for the DHH population were not referred for the assessment and treatment of mental disorders. Most likely, this is a consequence of the fact that the presence of a specialist institution for DHH individuals in a region is likely to result in increased referrals of all types of patients, not only those for whom the service originally was set up (Black & Glickman, 2006). Therefore, we explicitly defined the study sample, setting inclusion and exclusion criteria according to the research questions. This also allows us to compare our results to research findings from studies of mental disorders in patients utilizing general mental health services. In Norway, individuals with intellectual disabilities and/or pervasive developmental disorders are primarily assessed and treated in specialized habilitation services. Therefore, DHH adults with these diagnoses were not included in the current sample. Also, for ethical reasons, patients with acute, severe psychiatric (e.g., acute psychotic episode, severe traumatization after rape) or somatic illness (e.g., recently diagnosed cancer) whom the clinicians considered unfit to participate in the study were not asked to participate. This may have influenced the frequencies and distribution of the disorders diagnosed, particularly the prevalence of psychotic disorders.

The TEC is designed to assess the number of potentially traumatic events an individual has experienced and their impact on the individual during the whole lifespan (Nijenhuis et al., 2002). However, it is important to note that the TEC does not include any items about adult relationships such as those with partners or spouses. The questions about relational trauma included in the TEC focus mainly on traumatic events related to family members and other significant persons in childhood and adolescence. Only two of the 29 items focus on interpersonal relations in adult life. This limitation may have influenced the assessment of lifetime trauma in the present study as intimate partner violence and domestic violence were hardly examined. The results of previous studies indicate that the trauma scores found in this study would have been even higher if intimate adult relationships had been included in the inventory.
The GAF scale is a measure of overall impairment caused by mental factors (Endicott et al., 1976). However, when assessing persons who have mental disorders and hearing loss, it may be challenging for clinicians and researchers to distinguish between low functioning caused by mental factors and that caused by other conditions. For example, unemployment may be a consequence of a lack of available jobs for people with hearing loss as well as an outcome of mental dysfunction. Unfortunately, the GAF provides no measure for differentiating between the two.

Strengths and limitations
This study has several strengths. It comprised all adult DHH patients who were consecutively referred in an 18 month period and who consented to participate. The sample \((N = 84)\) included 85% of the patients who were asked to participate in the study and is representative of consecutively referred patients.

The study presents an example of a structured and systematic assessment routine used with DHH adult psychiatric outpatients. All participants in the present study underwent similar assessment procedures, carried out by the same group of clinicians. NSL versions of the assessment instruments were used when diagnosing signing patients. The MINI, the TEC, and the SCL-25 were translated into Norwegian sign language for the purpose of this study. All NSL versions of the assessment instruments show good psychometric properties. The diagnostics were conducted by psychiatrists and specialists of clinical psychology who carried out the assessment interviews in NSL, spoken Norwegian, or sign-supported speech, depending on each patient’s preferred language and communication mode. All therapists had knowledge about audiology, deafness, deaf culture, and the potential psychosocial consequences of partial or no hearing. Moreover, all of them had extensive clinical experience with DHH patients and were skilled in NSL and the various communication modes used by the patients.

Diaz and associates (2013) suggest guidelines for the assessment of mental disorders in the DHH population, and state that “the first step in the assessment of deaf individuals is to determine their preferred mode and fluency of communication” (p. 89). They further propose the assessment of “Deafness history,” including the etiology of the hearing loss, age at onset, educational setting and communication history, before beginning the assessment of mental disorders. The present study fulfilled most of these requirements. However, as Norwegian Sign Language is not yet fully described, and there are no assessment instruments to evaluate
impressive and expressive skills in Norwegian sign language, these are issues that need to be resolved in the future.

The NSL version of the MINI proved to be a reliable diagnostic tool for assessing mental disorders in signing persons, provided that it was used by professionals with appropriate sign language skills and knowledge about the patient group. The results of the study therefore encourage translation of the MINI into other sign languages and have inspired the translation and validation of other assessment instruments.

As no other validated diagnostic assessment instrument was available in NSL, the clinical intake interview was used as “expert opinion.” To ensure that the open clinical intake interview would serve as expert opinion for the validation of the NSL version of the MINI, inter-rater reliability was assessed. A second rater re-diagnosed the participants from video recordings of the original assessment interviews, a common procedure in reliability studies (Grove, Andreasen, McDonald-Scott, Keller, Shapiro, 1981). As far as we know, this approach had not been applied in research with DHH persons. The MINI and expert diagnoses showed fair to substantial agreement in this sample.

Supplementing the clinical diagnostic interview with the use of standardized instruments, as was done in this study, offers several advantages: first, it permits the assessment of a broad range of potential disorders; second, it ensures the quality of the assessment; and finally, it enables the evaluation of comorbidity. In the present study the MINI indicated a larger number of comorbid conditions than did the expert opinion. Similar results have been reported in other studies (Otsubo et al., 2005; Pinninti et al., 2003) and suggest that the structure of the MINI may make the clinician more attentive to symptoms of secondary diagnoses. This shift in attention reduces the risk of diagnostic shadowing. This interpretation speaks in favor of including the MINI and other standardized instruments in routine assessment of DHH individuals who use sign language, as is practiced elsewhere. However, caution should be taken not to assess severe and complex mental conditions using diagnostic categories only.

However, there were also limitations. The total population of DHH patients with mental disorders in Norway is small. The present study included all adult DHH patients who were consecutively referred in an 18 month period and who consented to participate. A pre-study power analysis would not have influenced the sample size within the study’s time frame. Because of the present small sub-sample sizes, relatively high effect sizes are needed to obtain statistical power for detecting true differences in the total DHH psychiatric patient population. Therefore, statistically non-significant differences in the comparisons of
subgroups may have been caused by small and moderate effect sizes, and the results must be interpreted with caution. However, clinical research with DHH patients seldom produces large samples, and the findings of this study may be interpreted as tentative, calling for further studies, preferably multi-center studies with larger samples.

Ten of the referred patients did not attend their appointments. The loss of these participants may have caused bias and thus may represent a study limitation. However, we have no information on how the participation of these patients might have influenced the data.

In the study comparing clinical and demographic variables in patients using signed and spoken language ($N = 76$), GAF scores were missing for seven patients (9%). Their demographic and clinical characteristics did not differ significantly from those of the patients with GAF scores. Also, SCL-25 scores were missing for 17 (22%) of the patients. The patients who did and did not complete SCL-25 were compared on gender, language, age at assessment, age at onset of hearing loss, age at onset of mental disorder, and GAF function and symptoms scores. There were no clinically or statistically significant differences between the 17 patients missing scores and the 59 with SCL scores, except that significantly more Norwegian speaking (89%) than signing (68%) patients had SCL scores. Also, a comparison of the background variables of the patients who agreed to participate in the trauma study ($N = 75$) with the patients who completed all assessments ($N = 62$) demonstrated that a larger proportion of the hard of hearing than deaf patients returned the TEC questionnaire, even though all were offered both a sign language presentation and a written questionnaire. The patients who did not return the TEC were not included in the sample.

Even though great efforts were taken to translate the assessment instruments into NSL, to instruct and train the therapists, and to secure good, mutual communication with all the patients, the overall finding was that more patients who use sign language failed to return the self-report forms. This did not become evident until the study period ended. This could have been avoided by closer follow-up of both patients and professionals.

Because the study sample consisted of DHH adults who were referred for assessment and treatment of mental disorders, the results cannot be generalized to the entire DHH population. Moreover, because the study sample included consecutively referred patients, the findings cannot be generalized to the total patient group, on the other hand, a cross-sectional design including the total patient group, would have produced an overrepresentation of patients with severe mental disorders in need of comprehensive and long-term treatment.
Future research

The translation, use, and validation of the MINI proved satisfactory and demonstrated the applicability of standard assessment instruments in clinical and research practice with DHH individuals who use sign language. This finding encourages the translation and validation of other approved assessment instruments to provide equal mental health services to the DHH population.

The evidence base for mental disorders in general and trauma in particular is still lacking for the DHH population. Further research is warranted, both in clinical and non-clinical populations. As the DHH populations in most countries are small, research with DHH patients seldom produces large samples, and the findings of this study may be interpreted as tentative. Therefore, there is a need for further studies, preferably multicenter studies with larger samples.

The DHH population using spoken language is growing because newborn hearing screening has been implemented. Currently, more than 90% of Norwegian babies born deaf receive a CI during their first year of life and are offered intensive speech training throughout childhood (Wie, 2010). To develop adequate interventions to prevent stress-related disorders and social isolation, further research is needed regarding the development of DHH children who use spoken language and how childhood hearing loss affects their wellbeing and psychosocial functioning.

To improve the evidence base, future research should include epidemiological and clinical studies of the mental health trajectories of the total DHH population. Specific action should be taken to uncover the need for mental health services among those in the DHH population who speak the language of the majority society; for example, there is a need to investigate whether the hard of hearing patients who are referred to the specialized services are more or less severely mentally ill than those seeking treatment elsewhere, or if they differ systematically from other hard of hearing psychiatric patients in other respects.
Clinical Implications

The findings of the present study indicate that the DHH patients referred to the specialized services who use sign language and those who use spoken language had similar needs for assessment and treatment. In addition, the patients who use spoken language and who sought treatment in the specialized mental health services for the DHH population were more vulnerable to medical disorders and social isolation than the patients who used sign language. Clinicians may therefore need to assess possible stressors in patients’ lives and how these affect their wellbeing. The assessment should cover both current and earlier sources of stress because what constitutes a stressful event may vary in different phases of life. Clinicians should also focus on revealing potential conditions resulting from and leading to social isolation, as isolation may be both a source and a coping strategy related to social stress.

Most of the patients in this study reported having experienced high-impact traumatic events, which indicates that clinical intake interviews should routinely include assessment of potentially traumatic events. The vast general literature on trauma focuses mainly on childhood trauma and its negative effects in childhood and adult life. This study found that most patients had experienced trauma both in childhood and adulthood, and that patients who experienced trauma in adult life reported as high a level of mental distress as patients reporting childhood trauma only. The findings suggest that assessment of adulthood trauma should also be part of the clinical intake interview with DHH patients, and that mental health professionals who work with DHH patients should have comprehensive skills in assessing and treating trauma-related disorders.

The general lack of health information among the DHH population, which has been documented in previous health research (Diaz et al., 2013; Kuenburg et al., 2016; Pollard, 1994; Pollard & Barnett, 2009), may cause DHH individuals to seek treatment at later stages of illness, a delay which may cause more severe conditions to develop. This situation needs to be dealt with, and may require collaboration between the educational and health systems if it is to improve (van Gent, Goedhart, Hindley, & Treffers, 2007).

It was unexpected that half of the referred patients used mainly spoken language. This indicates that specialized mental health services for the DHH population require professionals to not only master sign language, but to have broader competence combining expertise of psychiatry, clinical psychology, linguistics, and communication science, as well as knowledge about the psychosocial consequences of hearing loss and deafness. This relates specifically to the potential health consequences of being hard of hearing, using spoken language, and
working and socializing in the dominant hearing society. Most general mental health services are unlikely to have such proficiency and may be unable to offer adequate assessment and treatment to the DHH patient population, even if they use the same language.

When assessing and treating DHH patients who use sign language, professionals are generally aware and considerate of the need to secure mutual language and support good communication. However, the need for special knowledge is more likely to be overlooked when interacting with DHH patients who use spoken language. These patients may in fact need adaptations in the assessment and treatment sessions (e.g., amplification systems, special lighting conditions, and positioning in the room) for optimal communication and treatment to take place. The knowledge and skills necessary to fulfill these requirements are found in the specialized services, but only occasionally among professionals in the general mental health services.

Ideally, general mental health practitioners should evaluate whether they have the knowledge and skills required to assess and treat DHH patients who use either a signed or spoken language. If they do not have these skills, they should refer the patients to a specialized service for the DHH population. This in turn requires knowledge of the existence of the specialized services and of appropriate referral routines. In addition, an increase in patient referrals to the specialized services calls for sufficient capacity to serve the total DHH population.

The number of those in the DHH population who use spoken language has been growing since newborn hearing screening has been implemented, resulting in more cochlear implants for children early in life, most of whom attend ordinary schools. It is necessary both to promote opportunities for these children to meet, socialize, and develop friendships with peers and to enable adequate interventions to prevent stress-related disorders and social isolation. “Because DHH students in a general education classroom may have only hearing peers, social isolation may be a problem. … Social behavior is highly dependent on context, so it is important to investigate the kinds of family and school environments that secure positive social outcomes” (Antia et al., 2010, p. 89).
Conclusions

In this sample of patients referred to specialized mental health services for the DHH population, there were some clinical and demographic differences between patients who use signed and spoken language. Medical comorbidity was significantly more prevalent in DHH patients who use spoken language, and these patients also tended to be more socially isolated and stressed. Apart from these findings, the level of mental distress and daily functioning did not differ significantly between the groups; neither did the distribution of mental disorders.

Most of the DHH patients reported having experienced high-impact traumatic events, which may have contributed to their mental distress. Hearing loss of any degree seems to be associated with a risk of experiencing traumatic events, regardless of whether the hearing loss is congenital or acquired in childhood or in adulthood and whether the language used is spoken or signed.

Patients who had experienced childhood trauma were significantly younger at onset of mental disorder and presented more severe symptoms of mental distress than did patients who had experienced trauma in adult life only, indicating that trauma early in life may be associated with more severe symptoms and earlier onset of mental disorders.

Traumatization proved to be characterized by subjectively reported experience of high-impact trauma, and not by the prevalence of potentially traumatic events alone. The different patterns of traumatization found in female and male DHH patients were similar to patterns found in clinical samples of the general hearing population, suggesting similar influences on the course of mental disorder. The lack of significant associations between frequency of trauma and school setting, and between communicative competence of childhood caregivers and degree of traumatization, indicates the complexity of risk and protective factors and that the environment outside the home may have both a positive and negative influence. It may also reflect changes in parents’ knowledge of the signing and deaf culture and in the quality of school environments, suggesting that these factors may be less important for the population sampled in our study than for populations sampled in earlier studies.

The study findings indicate that the distribution of mental disorders in adult DHH psychiatric outpatients is similar to the distribution of mental disorders in psychiatric outpatients from the general hearing adult population.
The study shows that it is possible to assess DHH individuals who use sign language in a similar manner as individuals who use spoken language and obtain valid and reliable results. The requirements are as follows: first, the assessment instruments must be translated into sign language using approved procedures; second, they must be used by mental health professionals who have both sufficient knowledge about the developmental and psychosocial aspects of growing up and living with no or partial hearing and skills in sign language and other communication methods used by the DHH population; and finally, there must be sufficient time to conduct the assessment.
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Psychometric properties of a sign language version of the Mini International Neuropsychiatric Interview (MINI)

Beate Øhre1,2*, Hege Salttes1, Stephen von Tetzchner2 and Erik Falkum3,4

Abstract

Background: There is a need for psychiatric assessment instruments that enable reliable diagnoses in persons with hearing loss who have sign language as their primary language. The objective of this study was to assess the validity of the Norwegian Sign Language (NSL) version of the Mini International Neuropsychiatric Interview (MINI).

Methods: The MINI was translated into NSL. Forty-one signing patients consecutively referred to two specialised psychiatric units were assessed with a diagnostic interview by clinical experts and with the MINI. Inter-rater reliability was assessed with Cohen’s kappa and “observed agreement”.

Results: There was 65% agreement between MINI diagnoses and clinical expert diagnoses. Kappa values indicated fair to moderate agreement, and observed agreement was above 76% for all diagnoses. The MINI diagnosed more co-morbid conditions than did the clinical expert interview (mean diagnoses: 1.9 versus 1.2). Kappa values indicated moderate to substantial agreement, and “observed agreement” was above 88%.

Conclusion: The NSL version performs similarly to other MINI versions and demonstrates adequate reliability and validity as a diagnostic instrument for assessing mental disorders in persons who have sign language as their primary and preferred language.

Keywords: MINI, Mental disorders, Psychiatric diagnoses, Assessment, Deafness, Hearing loss, Sign language, Psychometrics

Background

Language and communication are fundamental for diagnosing most mental disorders. Most assessment instruments are designed for use with hearing individuals, and many deaf and severely hard-of-hearing people with psychiatric illness may receive incorrect diagnoses because of challenges in communication between patients and professionals [1-3]. The resulting lack of diagnostic precision may have serious bearing on treatment adequacy and quality. In Norway and other countries, there is a need for valid and reliable instruments for assessment of mental disorders in deaf and severely hard-of-hearing persons who have sign language as their primary and preferred language (signers).

The Mini International Neuropsychiatric Interview (MINI) was developed to meet the need for a brief and reliable structured diagnostic interview in clinical practice as well as in research [4,5]. In clinical practice, the MINI is considered a supplement and not a substitution for regular diagnostic intake interviews. It is a structured evaluation of most of the major psychiatric conditions [4,5], and was therefore selected for translation into Norwegian Sign Language (NSL).

The MINI includes 23 disorders from the tenth revision of the International Classification of Diseases and Related Health Problems (ICD-10) [6] and from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM IV) [7]. It is organised in diagnostic sections with branching tree logic and two to four screening questions with yes or no responses for each disorder. Additional symptom questions are asked only when a screening question is endorsed [4,8]. Excellent
inter-rater and test-retest reliabilities have been reported for the English and French versions [9], as well as good to very good convergent validity relative to the Composite International Diagnostic Interview, CIDI [4] and the Structured Clinical Interview for Diagnostic and Statistical Manual, SCID [5]. In test-retest analyses, kappa values have indicated excellent agreement according to Fleiss [10] for six diagnoses, fair to good agreement for six diagnoses and poor agreement for seven diagnoses, whereas observed inter-rater agreement has been 75% or above [5].

When a psychiatric diagnostic instrument is translated into a new language, reassessment of validity and reliability is necessary. Wordings that seem identical in different languages may nonetheless be differently interpreted, especially when a written text is translated to a sign language [11,12]. This is not just a matter of semantic divergences, but also of divergences related to cultural understanding of concepts, words (signs) and sentences. Development of expressions that both convey the question's core content and appear meaningful to the patient is vital.

The MINI has been translated into 43 languages, and its validity and reliability have been explored not only for the original English and the French versions, but also for the Spanish [13], Italian [14], Japanese [15], Moroccan [16], Portuguese [17] and Norwegian versions [18] (see Table 1). No sign language version has been reported. Deaf and hard-of-hearing people have been excluded from most mental health research, including validation studies of the MINI. Exclusion criteria cited in such research include “language problems” [4,14,15], “patients who were hearing impaired, not fluent in English” [19] and “could not be interviewed due to language barriers” [18].

Sign languages are natural languages that have evolved through use by deaf and hard-of-hearing people. Utterances are produced with the hands and face and are visually received and decoded [20,21]. Sign languages share many linguistic characteristics with spoken languages, but also have characteristics that are specific to the manual-visual modality [20,21]. Most deaf adults use written language and consider it their second language; however, a considerable percentage of congenitally deaf people struggle with written texts [22,23].

To reliably diagnose mental illness in signing persons, clinicians must have sufficient sign language competence and thorough knowledge of deaf culture. They must also have a deep understanding of the potential psychosocial consequences of profound hearing loss, the accompanying language and communication challenges, and the obstacles encountered by many deaf and hard-of-hearing people in society. If these requirements are not met, clinicians may misinterpret the patient’s utterances as symptoms of mental illness or thought disturbances, or may overlook symptoms of mental illness because they are not communicated in the expected manner.

The present study investigates the functionality of a NSL version of the MINI. The main research question is whether this version functions in the same manner with signing deaf and hard-of-hearing patients as do other versions of the MINI with hearing patients.

**Methods**

The present investigation is part of a comprehensive study of mental health in individuals referred to specialised psychiatric units for deaf and severely hard-of-hearing patients, and includes patients using different modes of communication and language.

**Participants**

Deaf and severely hard-of-hearing signers who were referred to the unit for adults at the National Centre for Mental Health and Hearing Impairment, Oslo University Hospital and the Regional Centre for Mental Health and Hearing Impairment, St. Olav’s Hospital, Trondheim were asked to participate in the study. Exclusion criteria were age below 18 years, spoken language as the main form of communication, dual sensory loss requiring tactile communication, acute and severe psychiatric or somatic illness, and referral for reasons other than assessment of mental disorder. Information was given in NSL or other forms of visual communication preferred by the person, and written consent was obtained from those who decided to participate.

Eighty-eight deaf and severely hard-of-hearing adults were referred to the two specialised mental health services in 2010 (total count of referrals throughout Norway was 120 persons). Twenty-eight of the 88 patients did not meet the inclusion criteria and five did not appear for their appointments. The remaining 55 patients were asked to participate in the study; 10 did not consent and four did not complete all the assessments. The sample therefore comprised 41 patients, or 75% of those who fulfilled the inclusion criteria. Table 2 shows background information for the participants. There were twice as many female as male participants (mean age, 36 years ± 14.1). Most participants had less than a college education, and one-third held a job or was studying.

**Assessments**

The assessments applied in this study were identical to the ordinary diagnostic assessments at intake. The results were documented in case notes from which personal identifiers had been removed. The diagnoses in these case notes were used to validate the diagnoses assessed by the NSL version of the MINI.
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<td></td>
<td>Diagnostic agreement in 58% of the cases In 33% the disagreement was of substantial nature MINI diagnosed more co-morbid conditions</td>
<td>No Cohen’s kappa values available</td>
</tr>
<tr>
<td>Rossi et al. [14] Italian</td>
<td>Psychiatric outpatients N = 50</td>
<td></td>
<td></td>
<td>Major depressive disorder, current Inter-rater reliability (kappa) 0.96. Test-retest (kappa) 0.46</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td>Major depressive disorder, recurrent Inter-rater reliability (kappa) 0.84. Test-retest (kappa) 0.36</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Panic disorder lifetime Inter-rater reliability (kappa) 0.88. Test-retest (kappa) 0.49</td>
<td>Information on diagnoses occurring in less than 5% of participants not available</td>
</tr>
<tr>
<td>Kadri et al. [16] Moroccan</td>
<td>Psychiatric patients N = 175 Non-patients, N = 50 Total N = 225</td>
<td>Expert opinion</td>
<td>Inter-rater and test-retest analyses</td>
<td>Concordance between MINI and expert diagnoses Major depressive disorder (kappa) 0.95, observed agreement: 99%</td>
<td>Thirteen diagnostic categories analysed Four diagnoses occurred in less than 5% of participants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Social phobia (5% of participants) (kappa) 0.91, obs. agreement: 94%</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Inter-rater and test-retest reliability (kappa) all above 0.80</td>
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</tr>
<tr>
<td>Otsubo et al. [15] Japanese</td>
<td>Psychiatric inpatients N = 82&lt;sup&gt;a&lt;/sup&gt; N = 169</td>
<td>SCID-P&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Inter-rater and test-retest analyses</td>
<td>Concordance between MINI and SCID-P&lt;sup&gt;1&lt;/sup&gt; expert opinion Major depressive disorder, &lt;sup&gt;a&lt;/sup&gt;kappa 0.83, obs. agreement: 93%</td>
<td>Thirteen diagnostic categories analysed Four diagnoses occurred in less than 5% of participants</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>&lt;sup&gt;b&lt;/sup&gt;kappa 0.36, obs. agreement: 69%</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Panic disorder, &lt;sup&gt;a&lt;/sup&gt;kappa 0.92, obs. agreement: 98%</td>
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<td></td>
<td>&lt;sup&gt;b&lt;/sup&gt;kappa 0.53, obs. agreement: 89%</td>
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<td></td>
<td></td>
<td>MINI test-retest, kappa 0.82, obs. agreement: 91%</td>
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<td></td>
<td></td>
<td>MINI Inter-rater, kappa 0.94, obs. agreement: 97%</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Country/Region</td>
<td>Setting</td>
<td>Language</td>
<td>Sample Size</td>
<td>Method</td>
</tr>
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<tr>
<td>Marques &amp; Zuardi [17]</td>
<td>Portuguese</td>
<td>Primary health care patients N=120</td>
<td>SCID³</td>
<td>Concordance between MINI and SCID³ diagnoses Depressive disorders, kappa: 0.75, obs. agreement: 92%</td>
<td>Anxiety disorders, kappa: 0.81, obs. agreement: 94%</td>
</tr>
<tr>
<td>Mordal et al. [18]</td>
<td>Norwegian</td>
<td>Psychiatric patients, acute ward N=38</td>
<td></td>
<td>Concordance of MINI diagnoses in test-retest</td>
<td>Major depressive episode, kappa: 0.82, obs. agreement: 92%</td>
</tr>
</tbody>
</table>

¹The Structured Clinical Interview for Diagnostic and Statistical Manual III-R Patient version.
²The Composite International Diagnostic Interview.
³The Structured Clinical Interview for Diagnostic and Statistical Manual IV.
The MINI
The MINI 5.0.0 was translated from Norwegian into NSL in 2008–2009 through an agreement with Dr. Ulrik Malt, who was leading the team that translated the MINI from English to Norwegian [24]. The translation was performed in accordance with internationally acknowledged translation procedures [25,26] as well as specific procedures suggested for translating written and spoken material into sign language [11,22,27]. A bilingual team of hearing and deaf clinicians and researchers translated each item into sign language and sent video-recordings to deaf and hearing bilingual professionals not familiar with the original text, who back-translated the items into written Norwegian. The research team compared the back-translations to the original written text, and if a back-translated item did not correspond to the content and intent of the original item, the item was discussed and rephrased. Consensus regarding the original text and back-translations was obtained before any item was included in the final video-recorded version. The video-recorded version was subsequently used to instruct and train the experienced MINI assessors, who were signers, to pose the questions of the MINI through uniform Norwegian Sign Language expressions.

Clinical interview (Expert opinion)
The standard intake interview used at Oslo University Hospital, Clinic of Mental Health and Addiction, was used as expert opinion. It was extended to include questions about background factors and life events that may affect the participant’s vulnerability to a mental disorder. These questions include cause of hearing loss, primary language and communication mode, communication environment in childhood, educational setting and experiences related to growing up with hearing loss.

Procedure
The clinical interview was conducted by clinical psychologists and psychiatrists, who had long experience with deaf and severely hard-of-hearing patients, were skilled in sign language, and had extensive knowledge about deafness and deaf culture. The communication with the participants was in NSL and was adapted to match the communication style of the participant as needed. The MINI interview was conducted in NSL by experienced MINI assessors.

Each participant was first seen by the team that would conduct the clinical intake interview (expert opinion). The MINI assessment was completed by another team consisting of a deaf therapist who is a native signer who posed the questions to the patients, and either a psychiatrist or a specialised clinical psychologist who guided the deaf co-therapist and the participant through the MINI interview and made the diagnostic decisions. Sometimes, the latter professional would also ask questions to obtain additional information. The two diagnostic teams received the referral information but did not share other information, and were blind to each other’s diagnoses. The two assessments were scheduled with minimal time lag between them. All assessment sessions were video-recorded, except those for three participants who did not want to be recorded.

To ensure that the clinical intake interviews were in fact appropriate to serve as expert opinion for validating the MINI, inter-rater reliability was computed. Eleven (27%) of the recorded clinical interviews were reassessed by a clinical psychologist who was familiar with the patient population and skilled in NSL. He received the referral information and made assessments based on the videotaped interviews, but was blind to the diagnoses given in the assessment. The same procedures were used to compute inter-rater reliability for eight (20%) of the MINI interviews. The patients were drawn randomly, but because the psychologist had to be blind to the person’s diagnoses, the same patient could not be reassessed twice. To prevent resampling, the patients whose intake interviews had been used for reassessment were excluded before the random subsample was drawn.

Table 2 Participant information (N = 41)

<table>
<thead>
<tr>
<th>Number of females</th>
<th>29 (71%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years mean: 36, SD 14.1, median: 34, range: 18–83</td>
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</tr>
<tr>
<td>Decibel loss in the better ear mean: 84.9, SD 13.8, median: 90, range: 56–110</td>
<td></td>
</tr>
<tr>
<td>Marital status Single 22 (53.7%) Married and cohabiting 15 (36.5%) Divorced, separated &amp; widowed 4 (9.8%)</td>
<td></td>
</tr>
<tr>
<td>Ethnicity European/Caucasian 37 (90.2%) Asian 4 (9.8%)</td>
<td></td>
</tr>
<tr>
<td>Education High school and equivalent 30 (73.2%) College degree and above 11 (26.8%)</td>
<td></td>
</tr>
<tr>
<td>Source of income Paid work and study loans 13 (31.7%) Social welfare and pension 28 (68.3%)</td>
<td></td>
</tr>
<tr>
<td>1GAF F at admission mean: 55.2, SD 12.4, median: 52, range: 31–76</td>
<td></td>
</tr>
<tr>
<td>2GAF S at admission mean: 55.5, SD 11.0, median: 56, range: 21–73</td>
<td></td>
</tr>
</tbody>
</table>

1Global Assessment of Function, Function score. 2Global Assessment of Function, Symptom score.

The MINI 5.0.0 was translated from Norwegian into NSL in 2008–2009 through an agreement with Dr. Ulrik Malt, who was leading the team that translated the MINI from English to Norwegian [24]. The translation was performed in accordance with internationally acknowledged translation procedures [25,26] as well as specific procedures suggested for translating written and spoken material into sign language [11,22,27]. A bilingual team of hearing and deaf clinicians and researchers translated each item into sign language and sent video-recordings to deaf and hearing bilingual professionals not familiar with the original text, who back-translated the items into written Norwegian. The research team compared the back-translations to the original written text, and if a back-translated item did not correspond to the content and intent of the original item, the item was discussed and rephrased. Consensus regarding the original text and back-translations was obtained before any item was included in the final video-recorded version. The video-recorded version was subsequently used to instruct and train the experienced MINI assessors, who were signers, to pose the questions of the MINI through uniform Norwegian Sign Language expressions.
Ethics
Study inclusion required informed consent. Participants were informed that they could withdraw from the study at any time and have their videos erased, without any consequences for their treatment. Any participant who might experience additional burden as a result of participation in the study would be offered appropriate support and counselling. The study was approved by the Regional Committee for Medical and Health Research Ethics (REK) and the Norwegian Data Protection Authority (NDPA).

Statistical analysis
SPSS version 20 was used to analyse the data. Cohen’s kappa was calculated to assess inter-rater reliability and to estimate the validity of the diagnoses assessed by the MINI. According to Shrout [28], kappa values above 0.80 indicate substantial agreement, 0.61–0.80 moderate agreement, 0.41–0.60 fair agreement, 0.11–0.40 slight agreement, and below 0.10 virtually no agreement. Approximate 95% confidence intervals were generated by multiplying the standard error of kappa by 1.96. The observed agreement was the frequency of two raters’ agreement on whether a disorder was present [29].

Results
The mean length of the MINI interview was 58 min (range 32–88). The most prevalent diagnoses assessed by expert opinion were major depressive disorder (n of diagnoses = 22; 54%) and anxiety disorder (n of diagnoses = 12; 29%). No participant met the criteria for mania, agoraphobia, obsessive compulsive disorder, anorexia nervosa or bulimia nervosa.

Twenty-eight participants (68%) received a diagnosis by both expert opinion and the MINI, with an average of 1.2 diagnoses according to expert opinion and 1.9 according to the MINI. Thirteen participants (32%) did not meet the criteria for any diagnosis on the MINI. Two of them did not receive a diagnosis by expert opinion—four were considered to have major depressive disorder—and seven were diagnosed with disorders of psychological development, mild mental retardation, personality disorder or disorder of severe stress and adjustment, which are included in ICD 10, but not in the MINI.

There was agreement about 49 (64%) of the 77 diagnoses given to the 41 participants.

In five conditions (6%) MINI gave no diagnosis and expert opinion assessed major depressive disorder, and in 13 conditions (17%) with a MINI diagnosis expert opinion assessed “no diagnosis”. Nine conditions (12%) were assigned a diagnosis included in the MINI by the MINI interview and a diagnosis not included in the MINI by the clinical interview. Last, there was major disagreement about one condition (1%), which was diagnosed as drug dependence by the MINI and as major depressive disorder by expert opinion (Additional file 1: Table S1).

Table 3 shows the concordance between the MINI and expert diagnoses. The participants’ conditions covered a wide range of diagnoses, and the two gross diagnostic categories of depressive disorders and anxiety disorders occurred in numbers sufficient to conduct kappa analyses. Four diagnoses were assigned to fewer than 5% of the participants. The point estimate of Cohen’s kappa was 0.46 for depressive disorders, indicating fair agreement according to Shrout [28], and 0.72 for anxiety disorders, indicating moderate agreement. The observed agreement between the raters was 73% and 88%, respectively (Table 4).

Twenty-six per cent of the participants underwent the two diagnostic interviews during the same day. The median number of days between the two interviews was 19 (range 0–115). The point estimate of Cohen’s kappa for depressive disorders was 0.46 for all participants, 0.50 for those who underwent the two interviews within 19 days, and 0.42 for those who waited longer than 19 days. For anxiety disorders the corresponding kappas were 0.72, 0.77, and 0.63.

Eleven participants who were diagnosed with a total of 17 conditions were used in the inter-rater reliability analysis of the diagnoses assessed by expert opinion; there was agreement about 11 conditions (65%). There was disagreement about six conditions (35%) concerning co-morbidity. For two conditions (12%), the initial expert opinion gave a diagnosis and the second rater did not; in another two conditions (12%), the reverse occurred. There was also major diagnostic disagreement about two additional conditions (12%) of co-morbidity. In some cases of disagreement, the second rater’s expert opinion diagnosis was in agreement with the MINI diagnosis and in conflict with the expert opinion. For instance, in one case, both the second rater and the MINI identified drug use, whereas the first expert diagnosed personality disorder (Additional file 2: Table S2).

Cohen’s kappa was computed for the two gross diagnostic categories “depressive disorders” and “anxiety disorders”. The point estimate of Cohen’s kappa in the analysis of the open clinical interview diagnoses was 0.81 for depressive disorders, indicating substantial agreement; the observed agreement was 91% (Table 5). For anxiety disorders, the point estimate of kappa was 0.44, indicating fair agreement, whereas the observed agreement was 73%.

In the inter-rater analysis of the diagnoses assessed by MINI, eight participants were diagnosed with 13 conditions; there was agreement about nine conditions (69%). In two conditions (15%) diagnosed by the initial MINI team as alcohol dependence and major depressive disorder, the second rater found no diagnosis. One condition (8%) was assessed as a dissocial personality disorder by the initial MINI team and as a psychotic disorder by the
second rater, and one condition (8%) was diagnosed as major depressive disorder by the initial MINI team and as a dissocial personality disorder by the second rater (Additional file 3: Table S3).

For the MINI assessments, the point estimate of Cohen’s kappa was 0.71 for depressive disorders, indicating moderate agreement, and the observed agreement was 88% (Table 6). For anxiety disorders, the agreement was complete (kappa = 1.00, observed agreement = 100%). Four instances of inter-rater disagreement mirrored the disagreement between expert opinion and the MINI diagnoses in the validation analysis.

**Discussion**

The MINI and expert diagnoses in deaf and severely hard-of-hearing signers referred for psychiatric evaluation show fair to substantial agreement. For validation against expert opinion, the kappa estimates in the present study are higher than those of Otsubo et al. [15] but lower than those of Kadri et al. [16]. Pinninti et al. [19] and Bobes [13] also used expert opinion for validation but did not offer kappa values.

The kappa scores were lower than those of studies that have validated MINI against SCID-P [5,15,17] and CIDI [4]. This is in line with other validation studies [13,15,19]. The kappa values in validations of the MINI against expert opinion were generally lower than when the MINI has been validated against a structured diagnostic instrument such as SCID-P or CIDI [4,5,15,17]. Only Kadri et al. [16] report relatively high concordance with expert opinion. The open clinical interview and the structured MINI interview represent different approaches to assessing mental disorders, and complete agreement therefore cannot be expected. Structured psychiatric interviews are designed to elicit information about core symptoms of a set of mental disorders, and the concordance of two structured interviews is therefore likely to be higher than for a structured and an open interview. The diagnostic reflections of experts using an open diagnostic interview are likely more diverse than the focused questions and selected list of disorders in the structured interviews.

The concordance of diagnoses was examined by two different methods because the sample size limited the use of kappa statistics. A broad range of diagnoses was

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**Table 3 Concordance between the Norwegian sign language version of the MINI and expert opinion, all patients’ diagnoses (N = 41)**

<table>
<thead>
<tr>
<th>Disorders assessed in the present study (sorted as in MINI)</th>
<th>MINI assessment</th>
<th>Cohen’s kappa (95% CI)</th>
<th>Observed agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major depressive disorder</td>
<td>- -</td>
<td>0.51 (0.26-0.77)</td>
<td>76%</td>
</tr>
<tr>
<td>Dysthymia*</td>
<td>+ -</td>
<td>0.38 (0.00-0.91)</td>
<td>93%</td>
</tr>
<tr>
<td>Panic disorder</td>
<td>- -</td>
<td>0.39 (0.07-0.72)</td>
<td>83%</td>
</tr>
<tr>
<td>Social anxiety disorder</td>
<td>+ -</td>
<td>0.69 (0.37-1.00)</td>
<td>93%</td>
</tr>
<tr>
<td>Posttraumatic stress disorder</td>
<td>+ -</td>
<td>0.36 (0.07-0.93)</td>
<td>93%</td>
</tr>
<tr>
<td>Alcohol dependence &amp; abuse</td>
<td>- -</td>
<td>0.79 (0.39-1.00)</td>
<td>98%</td>
</tr>
<tr>
<td>Substance abuse*</td>
<td>+ -</td>
<td>0.38 (0.00-0.91)</td>
<td>93%</td>
</tr>
<tr>
<td>Psychotic disorders*</td>
<td>+ -</td>
<td>1.00 (1.00)</td>
<td>100%</td>
</tr>
<tr>
<td>Generalised anxiety disorder</td>
<td>+ -</td>
<td>0.00 (0.00)</td>
<td>90%</td>
</tr>
<tr>
<td>Antisocial personality disorder*</td>
<td>+ -</td>
<td>0.66 (0.03-1.00)</td>
<td>96%</td>
</tr>
</tbody>
</table>

*Diagnoses occurring in less than 5% of the participants according to expert opinion.
found, some with very low frequency. Cohen’s kappa is a conservative indicator and functions best with larger samples. It is unlikely to be reliable when a diagnosis is assessed in fewer than five per cent of a sample [30]. Only “depressive disorders” and “anxiety disorders” were identified frequently enough to assess reliable kappa scores. Matrices were therefore drawn to show the distribution of diagnoses assessed with the two diagnostic methods and in the inter-rater reliability procedure. This concordance analysis indicates disagreement in approximately one-third of the diagnoses, with most disagreements related to the participants’ second diagnosis (co-morbidity). This finding applies to the validation of MINI versus expert opinion as well as to the inter-rater reliability of the expert diagnosis.

The main question in the present study is whether the NSL version of the MINI functions in the same manner as do other versions of the MINI when compared with expert opinion. Some of the lack of agreement between the two approaches may be caused by differences in diagnostic options. The MINI includes a limited number of diagnoses, and assessors will have to conform to those diagnoses or assign “no diagnosis”. Relying on the MINI for diagnostic assessment may therefore influence the direction of the evaluation, as clinicians attempt to comply with the diagnoses at hand. Clinicians who conduct an open interview have a wider range of diagnoses to consider, which again may shape the direction of their clinical line of thought and the resulting diagnosis. The fact that the kappa values in this study were in the lower range compared with other validation studies may also be partly explained by the presence of less severe disorders and fewer symptoms among the outpatients in this study than among the inpatients and acute ward patients assessed in most other studies (see Table 1).

The MINI indicated a larger number of co-morbid conditions than did the expert opinion. Similar results have been reported in other studies [15,19] and suggest that the structure of the MINI may make the clinician more attentive to symptoms related to disorders additional to the main diagnosis, and that this attentional shift reduces diagnostic shadowing. This interpretation speaks in favour of including the MINI in routine assessment of signers, as is practiced for hearing patients. On the other hand, assessing severe and complex mental conditions by diagnostic categories exclusively may also increase the probability that symptoms are overlooked.

The MINI was originally developed to meet the need for a structured assessment instrument that could be administered in minimal time. In the present study, the average MINI assessment required almost three times the estimated “less than 20 minutes” [8]. There may be several reasons for this. The interviews were conducted by two therapists, a method requiring collaboration and coordination, which may account for part of the extra time used. Furthermore, as was pointed out by Black and Glickman [3], many deaf patients with mental disorders do

<table>
<thead>
<tr>
<th>Table 4 Concordance between the Norwegian sign language version of the MINI and expert opinion, all patients’ diagnoses (N = 41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MINI assessment</td>
</tr>
<tr>
<td>Psychiatrist disorders</td>
</tr>
<tr>
<td>Depressive disorders</td>
</tr>
<tr>
<td>Anxiety disorders</td>
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<tr>
<td></td>
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<tr>
<td>Table 5 Inter-rater reliability estimates of diagnoses assessed by the initial clinical intake interview and by the second rater (N = 11)</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Second rater</td>
</tr>
<tr>
<td>Psychiatrist disorders</td>
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<tr>
<td>Depressive disorders</td>
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<tr>
<td>Anxiety disorders</td>
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<td></td>
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<tr>
<td>Table 6 Inter-rater reliability estimates for diagnoses assessed by the initial MINI assessment and by the second rater (N = 8)</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Second rater</td>
</tr>
<tr>
<td>Psychiatrist disorders</td>
</tr>
<tr>
<td>Depressive disorders</td>
</tr>
<tr>
<td>Anxiety disorders</td>
</tr>
<tr>
<td></td>
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</tbody>
</table>

1Depressive disorders include major depressive disorder, current; major depressive disorder, recurrent; and dysthymia.
2Anxiety disorders include panic disorder, social anxiety disorder, post-traumatic stress disorder, and generalized anxiety disorder.
not have full mastery of sign language and may struggle in expressing themselves and in comprehending what is being communicated to them, and this may lead to many repetitions. Finally, the interviewer cannot simultaneously take notes and communicate with the patient, and consequently the time needed for taking notes will add to the total interview time [12]. However, the reason for including the MINI as an assessment instrument for deaf and severely hard-of-hearing persons was to improve consistency, not to reduce assessment time.

The two most frequent diagnostic categories in the present study were “depressive disorders” and “anxiety disorders”. This result is similar to that of studies of psychiatric patient populations in general [8,31,32] as well as studies of mental disorders in signing deaf and hard-of-hearing patients [3,33]. To ensure that the open clinical intake interview would serve as expert opinion for the validation of the NSL version of the MINI, these two categories were used to assess inter-rater reliability. A second rater re-diagnosed the participants from video-recordings of the original assessment interviews, a common procedure in reliability studies [30]. To our knowledge, this approach has not been applied before in research with deaf and severely hard-of-hearing persons. It poses quite a few challenges to the second rater, who is forced to follow “the diagnostic route” of the clinician who conducted the initial assessment. This is no problem if the second rater agrees with the first, but second raters cannot collect additional information or follow alternative diagnostic routes when they disagree with the assumption of the original assessor. We do not know whether this issue influenced the concordance estimates in the present study.

The average time span between the two assessments was longer than reported in other validation studies of the MINI. Twenty-six per cent of the participants went through both interviews the same day, which may seem optimal. However, participation was voluntary and cancellations and postponements of appointments were rather common. Furthermore, the participants’ symptoms may have influenced their daily functioning and ability to keep appointments. The centralised service for this geographically scattered patient population is likely to have bearing on the time between assessments. When participants lived far from the outpatient clinic and the assessments could not be made on the same or consecutive days, the result was sometimes a long interval between assessments. However, kappa values for assessments made with short and long intervals were quite similar.

Limitations

There are some limitations to this study. First, the relatively small sample size, broad range of diagnoses, and low numbers for some diagnoses limit the reliability of kappa statistics. Another disadvantage of kappa statistics is that scores indicating adequate or inadequate reliability may be considered arbitrary. To be stringent, the rather strict classification scheme suggested by Shrout [28] was used.

Conclusion

The kappa scores in the present validation of the NSL version of the MINI and the observed agreements with expert opinion do not differ substantially from those of other validation studies. The NSL version appears to be a reliable diagnostic interview for assessing mental disorders in signing persons, provided that it is used by professionals with appropriate sign language skills and knowledge about the patient group. The results of the present study therefore encourage translation of the MINI into other sign languages.
Mental Disorders in Deaf and Hard of Hearing Adult Outpatients,
A Comparison of Linguistic Subgroups

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Maj Volden
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Erik Falkum
Oslo University Hospital; University of Oslo

Stephen von Tetzchner
University of Oslo

This is a pre-copyedited, author-produced PDF of an article accepted for publication in the Journal of Deaf Studies and Deaf Education following peer review. The version of record “Mental Disorders in Deaf and Hard of Hearing Adult Outpatients: A Comparison of Linguistic Subgroups Beate Ohre; Maj Volden; Erik Falkum; Stephen von Tetzchner The Journal of Deaf Studies and Deaf Education 2016; doi: 10.1093/deafed/enw061” is available online at:

http://jdsde.oxfordjournals.org/cgi/reprint/enw061?ijkey=iezVKe6NFJAAjN4&keytype=ref

http://jdsde.oxfordjournals.org/cgi/reprint/enw061?ijkey=iezVKe6NFJAAjN4&keytype=ref
Author Note

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BØ, MV, SvT, and EF all participated in the design and implementation of the study. BØ selected the assessment instruments and designed and led the translation procedures. BØ was in charge of the assessment procedures, and MV and BØ took part in the assessment of patients. BØ conducted the data analyses, and SvT and EF contributed to the interpretation of the data. BØ drafted the manuscript and MV, SvT, and EF critically revised it for important intellectual content. All authors have approved the submitted version.

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Abstract

Deaf and hard of hearing (DHH) individuals who use signed language and those who use spoken language face different challenges and stressors. Accordingly, the profile of their mental problems may also differ. However, studies of mental disorders in this population have seldom differentiated between linguistic groups. Our study compares demographics, mental disorders and levels of distress and functioning in 40 patients using Norwegian Sign Language (NSL) and 36 patients using spoken language. Assessment instruments were translated into NSL. More signers were deaf than hard of hearing, did not share a common language with their childhood caregivers, and had attended schools for DHH children. More patients using spoken language than patients using sign language reported medical comorbidity, while the distribution of mental disorders, symptoms of anxiety and depression, and daily functioning did not differ significantly. Somatic complaints and greater perceived social isolation may indicate higher stress levels in DHH patients using spoken language than in those using sign language. Therefore, preventive interventions are necessary, as well as larger epidemiological and clinical studies concerning the mental health of all language groups within the DHH population.
Mental Disorders in Deaf and Hard of Hearing Adult Outpatients,

A Comparison of Linguistic Groups

Within the framework of developmental psychopathology and the diathesis–stress model (Monroe & Simons, 1991), mental disorders result from individual vulnerability on the one hand and environmental risk on the other (Cicchetti & Cohen, 2006; Horowitz, 1987; Sameroff, 2014). Studies of mental health and disorders in individuals growing up in circumstances differing from that of the general population may contribute to the understanding of this process; as noted by proponents of the “Deaf Gain” perspective (Bauman & Murray, 2014), deaf and hard of hearing (DHH) people constitute one such group.

Developmental aspects

Partial or no hearing from birth or early childhood influences many aspects of life, particularly language development, communication and access to information. These factors are crucial for the cognitive, emotional and social development and functioning of an individual (e.g., Basilier, 1964, 1973; Fellinger et al, 2005; Hintermair, 2006). Problems related to language development, communication and social interaction caused by no or partial hearing are likely to influence social and environmental adaptation, and may increase the risk of mental distress and disorders (Andersson & Lawenius, 1997; Black & Glickman, 2006; Connolly, Rose, & Austen, 2006; Dalton, 2011; De Graaf & Bijl, 2002; Israeliite, Ower, & Goldstein, 2002).

Recent studies of mental distress and disorders in DHH outpatients

Adults who have been deaf or hard of hearing from birth or childhood and who develop mental disorders are an understudied population (De Bruin & de Graaf, 2004/2005; Diaz, Landsberger, Povlinski, Sheward, & Sculley, 2013; Fellinger, Holzinger, & Pollard, 2012). Since the 1990s, only four studies on DHH adult psychiatric outpatients have been published; two American (Pollard, 1994; Diaz et al., 2013), and two European (Appleford,
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2003; De Bruin & de Graaf, 2004/2005). All of them analyzed archival data but methodology and results vary considerably. The most prevalent mental disorders in these studies were mood disorders (13%–47%), neurotic, somatoform and stress-related disorders (19%–32%), alcohol and drug-induced disorders (3%–28%), and psychotic disorders (8%–27%). Two of the studies (De Bruin & de Graaf, 2004/2005; Diaz et al., 2013) described the participants’ backgrounds and preferred languages and modes of communication, but they did not address differences related to language or mode of communication. In fact, there is little discussion of the language heterogeneity in samples of DHH patients (e.g., Black & Glickman, 2006; Brown & Cornes, 2015; De Bruin & de Graaf, 2004/2005; Diaz et al., 2013; Fellinger et al., 2012).

Classification systems

The DHH population may be divided into subgroups according to various characteristics, including severity of hearing loss, age at onset of hearing loss, and linguistic and cultural identity (Austen & Coleman, 2004; Israelite et al., 2002). A distinction is often made between deaf and hard of hearing individuals, but the borderline between them is not sharp (Hindley, 1997). Hearing loss measured in decibel (dB) indicates functional disability, however, degree of hearing loss has not been found to predict quality of life or psychosocial outcome (Dammeyer, 2010; Fellinger, Holzinger, Sattel, & Laucht, 2008; Laugen, Jacobsen, Rieffe, & Wichstrøm, 2016). The distinction between DHH individuals who predominantly use sign language and those who predominantly use spoken language is essential because their social identity (Andersson & Lawenius, 1997; Israelite et al., 2002; Maxwell-McCaw & Zea, 2011), life situations, experiences and perceived stressors may differ considerably (Austen & Coleman, 2004; Breivik, 2007; Ladd, 2003). In a study of mental disorders in DHH teenage students, the only significant predictive background variable was the language used at home (Brown & Cornes, 2015). Some studies have addressed assessment, prevalence,
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treatment and prevention of mental disorders in signing DHH adult samples (Appleford, 2003; Black & Glickman, 2006; De Bruin & de Graaf, 2004/2005; De Graaf & Bijl, 2002; Fellinger et al., 2005; Haskins, 2004; Kvam, Loeb, & Tambs, 2007; Landsberger & Diaz, 2010; Leigh & Anthony-Tolbert, 2001; McClelland, Chisholm, & Powell, 2001; Werngren-Elgström, Dehlin, & Iwarsson, 2003). However, studies of adults who have been DHH from birth or childhood and use spoken language are scarce (Leigh, 2010). Potential clinical and demographic differences between subgroups of DHH psychiatric outpatients with different preferred language and modes of communication also remain unaddressed.

Language and communication

Most people who are deaf from birth or at an early age and to a lesser extent, severely hard of hearing individuals, use sign language, and some use sign-supported or manually coded speech (Austen & Coleman, 2004). Sign languages are natural languages that have evolved through use by DHH people. Sign languages share many linguistic features with spoken languages, but also have characteristics specific to the manual-visual modality (Emmorey & Lane, 2013; Klima & Bellugi, 1979; Stokoe, 1960). Most DHH adult signers use written language and consider it their second language, yet a considerable percentage of people with pre-lingual deafness or reduced hearing struggle with written texts (Hendar & O’Neill, 2016; Marschark, Spencer, Adams, & Sapere, 2011; Steinberg, Lipton, Eckhardt, Goldstein, & Sullivan, 1998). Signers do not primarily rely on their residual hearing for communication.

The majority of the hard of hearing population, and individuals who are post-lingually deaf, use the spoken language(s) of the society to which they belong. When communicating, they rely on their residual hearing, speech-reading, and conventional hearing aids, or cochlear implants (Austen & Coleman, 2004; Barnett, 2002; Middleton, et al., 2010).
The situation of DHH individuals in a lifespan perspective

Most of the life of DHH children is similar to that of hearing children’s but their language development significantly differs. More than 90 percent of DHH children are born into hearing families who have no prior knowledge about life without typical hearing or how to provide an optimal language environment for DHH children (Mitchell & Karchmer, 2004; Moores, 2001). Before the implementation of the newborn hearing screening (Anderssen, Andresen, Andersen, & Sponheim, 2002), the hearing status of many DHH children was not detected until they were between 2 and 3 years of age, and their language development was delayed or impaired (Vaccari & Marschark, 1997). This may have had consequences for parent–child communication, emotional bonding, and the child’s emotional, cognitive and social development (e.g., Hintermair, 2006; Wake, Hughes, Poulakis, Collins, & Rickards, 2004). DHH individuals using signed and spoken language face many of the same challenges, but there are also significant differences.

The situation of DHH individuals who use sign language. DHH children, who are born to signing DHH parents, and whose hearing loss or deafness was detected at birth or in early childhood, usually develop sign language in a way that parallels the spoken language development of hearing children (Meadow, Greenberg, Erting, & Carmichael, 1981; Øhre, 1987; Slowikowska, 2011; Woll, 2015). This is also true of most hearing children with DHH signing parents (Woll, 2015). However, most DHH children are raised by parents with limited sign language skills (Mitchell & Karchmer, 2004; Moores, 2001). Many of them may have been sent to residential schools for DHH children at age 7 years without knowing where they were going or why because they did not share sufficient language with their parents (Fundudis, Kolvin & Garside, 1979; Grønlie, 2005), and some children perceived this as traumatic (e.g., Kvam, 2004; Kvam & Loeb, 2010; Øhre, Uthus, von Tetzchner, & Falkum, 2015). Such experiences may have weakened the children’s attachment to their families and increased
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their vulnerability to mental distress because they lacked a familiar person to turn to for comfort and reassurance. Conversely, at school, the children met DHH peers with whom they shared language and experiences, and developed friendships that to some extent may have ameliorated distress resulting from separation from family (Breivik, 2007; Ladd, 2003). The children’s identification with the minority culture first encountered at school is likely to have been a protective factor against developing psychosocial problems and mental distress (Fellinger et al., 2012; Jambor & Elliott, 2005; Newman, Lohman, & Newman, 2007).

Signing DHH adults who attended daytime or residential schools for DHH students in their childhood, constitute the core of the group who identify as a linguistic and cultural minority. This group is often marked by a capital D in the literature; i.e., deaf individuals who traditionally socialize and identify with the Deaf community (Breivik, 2007; Ladd, 2003).

Members of the signing DHH population face lifetime communicative challenges when interacting with the majority hearing population because very few in this population know sign language (e.g., Breivik, 2007; Fellinger, 2005). Sign language is visible and signers are easily detected, in contrast to speaking DHH persons who may not be identified by society as having partial hearing, or who may wish to hide it (Wallhagen, 2010).

**The situation of DHH individuals who use spoken language.** Most DHH adults who speak Norwegian have spent their childhood and school-age years at home with their family, sharing the same language, attending a mainstream school and playing with their siblings and neighborhood friends. When good communication and adequate education are secured, many DHH individuals feel included and manage fairly well (Herheim, 2015). Others are unable to fully participate in social or school activities because of non-optimal conditions for listening and communication; their parents or teachers often do not acknowledge their need for communicative and environmental adaptations (Dalton, 2011; Herheim, 2015). DHH children are at risk of being bullied, mocked and socially isolated, likely due to the communicative
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challenges and ignorance caused by reduced access to information (Fellinger, Holzinger, Beitel, Laucht, & Goldberg, 2009; Herheim, 2015). Parents are often unaware of their child’s social isolation and physical complaints (Fellinger et al., 2008). Peer-group membership and sense of belonging are core protective factors against developing mental disorders (Fellinger et al., 2009; Newman et al., 2007). DHH individuals who use spoken language may blend in with the general population unnoticed; they speak the language of the majority and are therefore expected to perform as well as individuals with normal hearing (Laugen et al., 2016; Wake et al., 2004). Because hearing loss is invisible to society, DHH individuals must often actively inform others about their condition, and even then hearing communication partners may easily ignore or forget the DHH individual’s need for adaptations in communication and listening. Thus, despite sharing the language of the majority population, DHH individuals mainly using spoken language continue to struggle to communicate effectively with family and peers. Moreover, some are reluctant to self-identify as deaf or hard of hearing, fearing stigma and social isolation (e.g., Dalton, 2011). Restricted and dissatisfying social lives have been reported more often by hard of hearing adults who used spoken language than by DHH adults who used sign language as their main mode of communication (Fellinger, Holzinger, Gerich, & Goldberg, 2007).

Listening is strenuous to a person with severe hearing loss. It requires him/her to be attentive both visually and cognitively, and to actively concentrate on interpreting the sounds and content of the message that is being communicated. Uncertainties associated with the communication process may lead to concerns about misunderstanding and being misunderstood and a feeling of being at a loss and making a fool of oneself. When a person constantly fears that this may happen, the result may be physiological and psychological stress, elevated muscle tension, headaches, and exhaustion (Eriksen & Ursin, 2004; Fellinger et al., 2007; Israelite et al., 2002).
In summary, the situation faced by signing and speaking individuals who are DHH from childhood differs in important ways from that of hearing individuals. There is no reason to believe that hearing loss in itself should cause mental problems and distress (Øhre, von Tetzchner, & Falkum, 2011). However, the social consequences of being DHH in a predominantly hearing society are likely to impact on the development of mental distress and disorders.

**Study objectives**

The clinical consequences of potential differences in childhood conditions, lifetime communicative challenges, and daily stressors experienced by the two linguistic groups—DHH individuals who use sign language and those who use spoken language—have gained little attention in studies of mental health and disorders in the DHH population. The present exploratory study compares the distribution of mental illness symptoms and disorders as well as demographic characteristics in two groups: DHH patients using NSL, and DHH patients using spoken Norwegian who were referred for assessment and treatment to specialized psychiatric outpatient services for the DHH population. Patients using sign-supported Norwegian were included in the speaking group because spoken language was their dominant communication method. Therefore, we sometimes use the expression “mode of communication” in addition to “language”.

The following questions were addressed: Are demographic characteristics and the diagnoses, psychiatric and medical comorbidity, and symptom intensity of mental disorders different in patients using NSL compared with patients speaking Norwegian? Do they experience different levels of functioning and mental distress?

**Method**

Our study is part of a comprehensive study on mental health in individuals referred to specialized psychiatric outpatient clinics for DHH patients in Norway.
Participants

All adult patients consecutively referred to the specialized services for DHH patients (the National Unit for Mental Health and Hearing Impairment, Oslo University Hospital, and the Regional Centre for Mental Health and Hearing Impairment, St. Olav’s Hospital, Trondheim) were invited to participate in the study. Participants were recruited from January 1st 2010 through June 30th 2011.

The exclusion criteria were age below 18 years, dual sensory loss (deaf-blindness) requiring tactile communication, referral for reasons other than assessment and treatment of mental disorders, and acute and severe psychiatric or somatic illness. Because of the exclusion criteria, the study sample mainly comprises patients with non-psychotic disorders.

In total, 126 DHH adults were referred to the two specialized mental health outpatient units during the inclusion period. Seventeen patients did not meet the inclusion criteria, and 10 failed to attend their appointments. The remaining 99 patients were asked to participate, and 84 consented. Because the study focuses on consequences of early hearing loss, eight patients (all Norwegian-speaking) who had become DHH after age 6 years were excluded. Our study thus includes 76 patients with childhood hearing loss: 40 patients using NSL and 36 patients using spoken language.

Assessment

To minimize the risk of misdiagnosis, mental assessment of DHH individuals requires clinically skilled, culturally sensitive, sign language-fluent professionals who can communicate directly with their DHH patients (Diaz et al., 2013; Fellinger et al., 2012; Pollard, 1994). In the present study, the participating professionals were experienced mental health specialists skilled in sign language and the cultural and psychosocial aspects relevant to psychiatric assessment of DHH patients.
Diagnostic assessments ordinarily made at intake were conducted: Mini International Neuropsychiatric Interview (MINI), the Symptom Check List-25 (SCL-25), and the Global Assessment of Functioning Scale (GAF). Results were documented in case notes from which personal identifiers had been removed.

Translation procedures. The MINI and the SCL-25 were translated from Norwegian into NSL in 2008 and 2009 (Øhre, Saltnes, von Tetzchner, & Falkum, 2014). Translation was performed in accordance with internationally acknowledged translation procedures for diagnostic instruments (Bhui, Mohamud, Warfa, Craig, & Stansfeld, 2003; John & Benet-Martinez, 2000; Maneesriwongul & Dixson, 2004) and with recommended procedures for translating from written and spoken material into sign language (Steinberg, Lipton, Eckhardt, Goldstein, & Sullivan, 1998; Cornes, Rohan, Napier, & Rey, 2006).

A bilingual team of hearing and DHH clinicians and researchers translated each item of the assessment tools into sign language. Consensus was reached for all items of the signed versions, then each assessment tool was video recorded and back-translated into written Norwegian by DHH and hearing bilingual professionals unfamiliar with the original text. The research team compared the back-translations to the original written text. When back-translated items did not correspond to the content and intent of the original items, these items were discussed and rephrased. Consensus regarding the original text and back-translations was obtained before any item was included into the final version. This final version was then video recorded and used to train signing therapists on correct presentation of questions using uniform NSL expressions.

Clinical interview. We extended the standard clinical intake interview to include questions concerning: Etiology and age at onset of hearing loss, primary language and communication mode, childhood communication environment, educational setting, and experiences related to growing up with partial or no hearing, or life experiences related to the
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loss of hearing. Information about hearing status, preferably an audiogram, was requested from all participants.

**The Mini International Neuropsychiatric Interview (MINI).** The MINI (Lecrubier et al., 1997; Sheehan et al., 1997) includes 23 disorders from the tenth revision of the *International Classification of Diseases and Related Health Problems* (World Health Organization, 1993) and from the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition (American Psychiatric Association, 1994). For the NSL version of the MINI, the inter-rater reliability ranged from fair to substantial (kappa = 0.44 and 1.00, respectively), as did the results of the validation of the NSL version of the MINI against expert opinion. For depressive disorders, kappa = 0.46 (95% CI: .19–.73) and for anxiety disorders, kappa = 0.72 (95% CI: .49–.94) (Øhre et al., 2014). In the present study, the MINI 5.0.0 was used either in spoken Norwegian language, with or without sign support, or in NSL.

**The Symptom Check List-25 (SCL-25).** The SCL-25 (Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974) is a widely used self-report instrument measuring symptoms of anxiety and depression. The SCL-25 includes 25 items scored on a four-point scale ranging from 1 (*not bothered*) to 4 (*extremely bothered*). The average item score (total score divided by the number of items answered) is often used to measure emotional distress and a cut-off point of 1.75 is the recommended threshold for diagnosing mental disorder (Nettelbladt, Hansson, Stefansson, Borgquist, & Nordsström, 1993; Sandanger, Moum, Ingebrigtsen, Dalgard, Sorensen, & Bruusgaard, 1998; Winokur, Winokur, Rickels, & Cox, 1984). When administered in Norwegian and NSL, Cronbach’s alpha was .91 for the total score, .86 for the Anxiety subscale, and .87 for the Depression subscale.

**The Global Assessment of Functioning Scale (GAF).** This 100-point scale (Endicott, Spitzer, Fleiss, & Cohen, 1976) measures overall impairment caused by mental factors, with a higher score indicating better functioning. The GAF split version (GAF symptom = GAF S,
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GAF functioning = GAF F), which was used in this study, is recommended for research purposes (Pedersen & Karterud, 2012). We scored the GAF applying internationally established criteria used at the Oslo University Hospital; each patient’s case was discussed and scored by clinicians who had attended training courses at the Oslo University Hospital, or at St. Olav’s Hospital, Trondheim.

**Procedure**

Participating patients were assessed at the two hospitals, and two intake assessment sessions were scheduled. The patients’ preferred language and mode of communication were registered at the beginning of the first assessment session. The procedure was identical to ordinary, clinical intake assessment, and except for the video, did not differ whether the patient consented to participate in the study or not, this was clearly explained to all patients before the assessment took place. The study gathered data (where personal identifiers had been removed) from the initial clinical assessment, and did not include treatment. After the two initial assessment sessions, the clinicians decided upon therapy course based on the assessments, independent of participation in the study. Throughout the study, communication between patients and professionals was in each patient’s preferred language and communication mode: mainly NSL, spoken Norwegian, or sign-supported speech. One patient needed typed interpretation and one patient from a foreign country needed an interpreter. To reduce the risk of differences in signed utterances, all professionals were instructed and trained to pose the questions according to the filmed NSL versions. However, differences in vocabulary and NSL skills among the patients sometimes called for phrases to be adapted to enable the patient to comprehend what was being asked. All diagnostic assessment sessions were video recorded, except in the case of three patients who did not consent to recording. The video recordings were reviewed by different professionals: the project leader, specialists
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in clinical psychology and psychiatry, and co-therapists who are native signers. No major deviations from the protocol were detected.

The SCL-25 is a self-report instrument usually completed individually by the patients. Because some DHH patients may struggle to read written texts (Holt, 1993; Pollard & Barnett, 2009), the therapists asked all patients to check carefully if they understood the wording. They were also asked whether they preferred to fill in the questionnaires by themselves, or have the therapist pose the questions interview style and then fill in the appropriate answer themselves.

Ethics

The Regional Committee for Medical and Health Research Ethics and the Norwegian Data Protection Authority approved the study. Written information was provided to eligible patients. To secure patients’ understanding of their potential role in the study, professionals supplied additional information in the patient’s preferred language, i.e., NSL or spoken Norwegian. Written consent was obtained from those who decided to participate. The participants were informed that they could withdraw from the study at any time and have their video recordings erased without any consequences to their treatment. Appropriate support and counseling were available to any participant who experienced additional stress resulting from study participation.

Statistical Analysis

Analyses include descriptive statistics, chi-square tests for comparisons of categorical data, Pearson product-moment correlation coefficients to examine associations in interval data, independent samples t tests to compare groups, and two-way between-groups analysis of variance to test for interaction.

SCL-25 scores were missing for 17 (22%) of the patients. The patients who did and did not complete SCL-25 were compared on the variables sex, language, age at assessment,
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age at onset of hearing loss, age at onset of mental disorder, and GAF function and symptoms scores. GAF scores were missing for seven patients (9%). The patients who had and did not have GAF scores were compared on the variables sex, language, age at assessment, age at onset of hearing loss, age at onset of mental disorder, and SCL-25 scores.

The large number of analyses conducted in this study increases the probability of Type I error (Bakan, 1967). However, because the study is exploratory, we have chosen to present all results to avoid overlooking important trends instead of adjusting the alpha level. Therefore, we interpret marginally significant results with caution.

The strength of the current findings was explored post-hoc, and because of small subsample sizes, only results with effect sizes ≥ .7 would have had the power to detect differences between subgroups in the population of DHH psychiatric outpatients.

In all statistical analyses, the significance level is two tailed. Data were analysed using IBM SPSS Statistics for Windows, Version 22.0. (IBM Corp., 2013).

**Results**

Forty patients (25 female and 15 male) using NSL and 36 (27 female and nine male) speaking Norwegian participated in the study. Audiograms were received from 36 (47%) patients, and physicians’ diagnoses of deafness and hearing loss from 29 patients (38%). Eleven patients (15%) did not provide information on hearing status. Of these 11 patients, nine had childhood hearing loss, were signers, had attended schools for DHH children and referred to themselves as deaf. Two had attended regular schools and used spoken Norwegian, one with and the other without sign support.

Table 1 shows the background characteristics of the total sample, comparing participants using NSL with those speaking Norwegian. The two language groups were similar on all general background variables.
Demographic variables related to hearing loss are shown in Table 2. Significantly more patients using NSL than those using spoken language were deaf (hearing loss > 80 dB) and significantly more patients using spoken language than those using NSL were hard of hearing (hearing loss ≤ 80 dB), the effect size was large. Identical percentages of the signing and the speaking participants reported having family members with and without hearing loss. Significantly more patients using NSL than patients who use spoken language did not have a shared language with their caregivers in childhood (medium effect size), were educated at schools for DHH children (large effect size) and attended residential schools (medium effect size). The different etiologies of hearing loss were distributed similarly in the two language groups.

Table 3 displays the patients’ mental disorders, assessed using the MINI (Lecrubier et al., 1997; Sheehan et al., 1997). The psychiatric diagnoses were assigned according to ICD-10 (WHO, 1993). Mood disorders and neurotic, stress-related and somatoform disorders were most common in both patients using NSL and those using spoken language. The numbers of patients within some of the diagnostic categories were too small to calculate a chi-square statistic. Therefore, only the scores on the broader diagnostic categories “Mood disorders” \((n = 35)\) and “Neurotic, stress related and somatoform disorders” \((n = 29)\) were compared. The distributions of the two linguistic groups on these two diagnostic categories were not significantly different.

The frequency of psychiatric comorbidity was similar in the two linguistic groups. In total, 16 (40%) of the patients using NSL and 13 (36%) of the patients using spoken language were diagnosed with more than one psychiatric diagnosis.

Table 4 shows no statistically significant differences between the language groups regarding age at onset of mental disorder. The average GAF functioning score at admission indicates a moderate reduction of educational, vocational, and general social functioning in
both language groups, and the mean GAF symptom score indicates moderate symptom
intensity. In both language groups, the SCL mean item scores on anxiety and depression were
above the recommended threshold for mental disorder (1.75). None of the minor group
differences were statistically significant.

Significantly more Norwegian-speaking than signing patients reported comorbid
medical conditions. They also reported more social isolation — a difference that approached
significance.

Two-way between-groups analysis of variance was conducted to examine the impact
of medical comorbidity and preferred language on symptom level of anxiety, measured by
SCL-25. The interaction effect between linguistic group and medical comorbidity was not
statistically significant, $F(1,55) = 1.31, p = .26$. There was a statistically significant main
effect for medical comorbidity, $F(1,55) = 4.23, p = .04$, with a moderate effect size (partial
eta squared = .07). The main effect for linguistic group, $F(1, 55) = .48, p = .49$ did not reach
statistical significance.

For patients using NSL, there was a moderate negative correlation between GAF-
Functioning and self-reported symptoms of anxiety ($r = -.42, p = .039$). For those using
spoken language, there were moderate negative correlations between GAF scores and self-
reported symptoms of both anxiety and depression (Anxiety/GAF-F: $r = -.50, p = .006$;
Anxiety/GAF-S: $r = -.61, p = .001$; Depression/GAF-S: $r = -.39, p = .035$).

No statistically significant differences were found between the 59 patients with SCL
scores and the 17 patients without SCL scores on the variables compared. However, we found
that significantly more Norwegian-speaking (89%) than signing (68%) patients had SCL
scores ($\chi^2(1, n = 76) = 3.84, p = .05, \phi = .26$). There were no statistically significant
differences between the patients who had and did not have GAF scores on the variables
compared.
Discussion

Our study compares two groups for whom reduced hearing has been a life-long issue and part of their identity. To our knowledge, this is the first study comparing clinical and demographic characteristics of adult DHH psychiatric outpatients with childhood hearing loss in two linguistic groups: those who use sign language and those who use spoken language.

A notable finding was that 47% of participants who were referred to the specialized mental health services spoke Norwegian, and 41% were hard of hearing. This was unexpected because the specialized mental health services in Norway were initially established to treat deaf patients who use sign language. We expect that in the future, a larger percentage of the total DHH psychiatric outpatient population will be speaking the language of the majority. This is because currently, >90% of Norwegian babies born deaf receive a cochlear implant (CI) during their first year of life and are offered intensive speech training throughout childhood (Wie, 2010). Traditionally, the mental health of adults with childhood hearing loss who use spoken language, has gained little attention. With the extensive implementation of the CI, the group who use spoken language will increase within the total DHH population, thereby making it essential to develop a sufficient knowledge base to implement optimal developmental conditions for this population (Laugen et al., 2016).

The percentage of Norwegian-speaking, hard of hearing adults who seek treatment for mental disorders using regular mental health services remains unknown. However, the referral rate of this patient group to the specialized services appears to be increasing. The main reason is probably attributable to the specialized services having the combined expertise of psychiatry, clinical psychology, and skills in the language and communication methods used by the patients, and the necessary knowledge of the psychosocial consequences of hearing loss.
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Population studies have found that mood disorders, neurotic, stress-related and somatoform disorders, disorders due to psychoactive substance use and personality disorders are most prevalent in the general population (Kringlen, Torgersen, & Cramer, 2001; Kessler, Chiu, Demler, & Walters, 2005). The results of the present study are in line with these findings. In both language groups, mood disorders and neurotic, somatoform and stress-related disorders were most frequently diagnosed, followed by alcohol and drug-induced disorders and personality disorders. Similar findings for DHH psychiatric outpatients have been reported by Diaz et al. (2013).

Many studies of mental disorders in DHH outpatients include a comparison-sample of psychiatric outpatients from the general population (e.g., Appleford, 2003; De Bruin & de Graaf, 2004/2005; Diaz et al., 2013; Pollard, 1994). Our study did not include a comparison-sample, but compared the results with those of Ose, Ådnanes & Pettersen’s Norwegian (2014) cross-sectional study of adult psychiatric outpatients from the general population ($N = 23,167$, median age 35 years, 63% female, 42% single, 40% paid work & study loans). They reported a similar distribution of psychiatric diagnoses when omitting acute psychotic disorders (excluded in our study).

The number of participants who reported that in their childhood their family had used the same language and mode of communication as what the patients now used as adults, differed between the two linguistic groups. Most patients (56%) using spoken language with or without sign support had parents who used the same language and modality, whereas only 15% of the patients using sign language had signing parents. Moreover, Fellinger et al. (2008) found that only 25% of parents in families with signing children regarded their own sign language skills as good. Language asymmetry between parents and DHH children has been considered a risk factor for mental health problems (e.g., Brown & Cornes, 2015; Wallis, Musselman, & MacKay, 2004). However, in the present study, language asymmetry between
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children and their parents in childhood was not associated with any mental disorder or symptom level of anxiety and depression in adulthood.

Families where the DHH child is the only signer constitute a unique linguistic situation. Hearing, non-signing parents often have problems when communicating about topics that are not concrete and present, thus limiting the child’s knowledge and understanding of emotional and social phenomena. Brown and Cornes’ (2015) study of self-reported mental health in Australian DHH teenagers found that “language used at home” was the only significant predictor of mental health problems. The DHH adolescents who spoke English and were raised by families speaking English reported significantly fewer mental health problems than other DHH adolescents. The authors highlight the central role of communication and the learning of concepts for the social and emotional development of the child; they further emphasize that this is not a matter of language modality. For signing children of non-signing parents, the risk of a non-optimal development may be related to the restricted linguistic exchange with their parents. In DHH children who use the same spoken language as their parents, the risk for non-optimal development may be related to the child’s partial hearing and understanding of what is being said, possibly combined with the parents’ limited understanding of their child’s communicative limitations.

The results of our study and that of Brown and Cornes’ (2015) may be interpreted as complementary. Brown and Cornes’ results indicate that absence of a shared language with parents may lead to significant distress in adolescence. The signing and Norwegian-speaking patients in the present study differed significantly with respect to severity of hearing loss, educational setting, childhood residence and mutual language with caregivers. However, there were no differences between the groups with regard to mental disorders, prevalence of psychiatric comorbidity, level of general functioning and symptom level of mental distress. One possible reason why the different communicative frames may not influence the pattern of
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mental health problems in DHH adult psychiatric patients may be that identifying with a group and having a shared language with peers may remediate the influence of early stressors due to impaired child–adult communication (Fellinger et al., 2012; Jambor & Elliott, 2005). Further, adult life contains experiences different from those of childhood and adolescence, which may have consequences different from those earlier in life (Øhre et al., 2015). In particular, the parents’ central role in helping their child cope with difficult life events is often replaced by spouses, partners or other significant persons in adult life.

The Norwegian-speaking patients reported significantly more somatic complaints and medical comorbidity than signing patients. This cannot be explained by the etiology of hearing loss, as the etiology did not differ between the linguistic groups. One interpretation may be that the higher prevalence of somatic complaints was related to stress in adult life. DHH adults who speak Norwegian typically work and socialize within the majority hearing society and are expected to meet the same standards as that of the hearing population. As a result, they likely spend much physical and mental energy to be able to follow spoken conversations or make sure that they obtain the information they need, both at work and in other social settings. Over time, physical stress reactions may result in medical disorders (e.g., head-ache, musculoskeletal complaints) (Dalton, 2011; Ursin & Eriksen, 2007; Williams, Falkum, & Martinsen, 2015). This interpretation is supported by the fact that somatic complaints were associated with anxiety. Furthermore, the adult DHH signing population has less knowledge about mental and medical health issues (Kuenburg, Fellinger, & Fellinger, 2016; Pollard & Barnett, 2009), and consequently may neither recognize nor report symptoms of potential disorders.

More Norwegian-speaking than signing patients reported that they were socially isolated, although the difference only approached statistical significance. Fellinger et al. (2009) found a difference between the two linguistic groups concerning peer-group inclusion and
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sense of belonging to a community. Most signing DHH adults culturally identify with and socialize within the Deaf community, whereas speaking DHH adults may feel that they belong neither to the Deaf nor the “hearing” society. Linguistically, they may appear integrated into the hearing majority society but they still struggle socially, and fear exclusion (Herheim, 2015; Williams et al., 2015). DHH individuals who rely on spoken language may actively isolate themselves to avoid negative social experiences. Alternatively, isolation may be a result of misunderstandings or social exclusion.

Scores on global symptoms and functioning were moderately reduced in both linguistic groups. The significant correlations between the patients’ self-assessed anxiety and depression scores on the SCL-25, and the clinicians’ assessments of symptoms and functioning on the GAF, indicate general agreement and good communication between patients and therapists. This was most clearly demonstrated for participants speaking Norwegian.

The sample in this study reflects the heterogeneity of referrals to the Norwegian specialized mental health outpatient clinics for DHH adults. The results may be more representative of the deaf psychiatric outpatient population who use sign language than of the total hard of hearing psychiatric outpatient population who use spoken language. The specialized psychiatric outpatient clinics serve the deaf, hard of hearing, and deaf-blind populations. There are approximately 5,000 DHH individuals in Norway whose natural first language was NSL (Peterson, 2012). The adult Norwegian hard of hearing population aged 18–62 years comprises approximately 100,000 persons (Hørselshemmedes Landsforbund [The Norwegian Association of the Hard of Hearing], 2014). The prevalence of pre-lingually hard of hearing adults is unknown but they likely comprise only a small percentage of the total hard of hearing population.
Strengths and Limitations

Our study has several strengths. All participants underwent similar assessment procedures, carried out by the same group of clinicians. NSL versions of the assessment instruments were used when diagnosing signing patients. The MINI-interview and SCL-25 were translated to NSL for the purpose of this study. All NSL versions of the assessment instruments show good psychometric properties.

The diagnostics were conducted by psychiatrists and specialists of clinical psychology who carried out the assessment interviews in NSL, spoken Norwegian, or sign-supported speech, depending on each patient’s preferred language and communication mode. All therapists had knowledge about audiology, deafness, deaf culture, and the potential psychosocial consequences of partial or no hearing. They also had extensive clinical experience with DHH patients, and were skilled in NSL and the various communication modes used by the patients.

The study has some limitations, and the results must therefore be interpreted with caution. The participants were DHH adults with childhood hearing loss who were referred for assessment and treatment of mental disorders. Therefore, the results cannot be generalized to the entire DHH population.

The total population of DHH patients with mental disorders in Norway is fortunately small. The present study included all adult DHH patients who were consecutively referred in an 18-month period and who consented to participate. Pre-study power analyses would not have influenced the sample size within the study’s time frame. According to Hoenig & Heisey (2001), post hoc power calculations are futile, although it has been recommended by some journals. Power is the probability of rejecting the null hypothesis in a (future) study, assuming a specific non-zero difference. Once the study has been conducted, this probability is either 1 (if the null hypothesis was rejected) else 0. Because of the present small sample size,
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relatively high effect sizes are needed to obtain statistical power for detecting true differences in the total DHH psychiatric patient population. Therefore, statistically non-significant differences in the comparisons of subgroups may have been caused by small and moderate effect sizes, and the results must be interpreted with caution. However, clinical research with DHH patients seldom produce large samples, and the findings of this study may be interpreted as tentative, calling for further studies, preferably multicenter studies, with larger samples.

The speaking and signing participants may have been selected from the hard of hearing and deaf populations in different ways. The proportions of each population referred to the specialized services and to the general mental health services respectively, remain unknown. The Norwegian-speaking sample may represent a smaller proportion of the population than the signing sample. Moreover, it is unknown whether the hard of hearing patients referred to the specialized services are more or less severely mentally ill than those seeking treatment elsewhere, or whether they differ systematically from other hard of hearing psychiatric patients in other respects. Thus, the findings cannot be generalized to the total DHH patient population. However, results do show the demographic and clinical characteristics and the distribution of mental disorders assessed at intake of consecutively referred patients to the specialized services.

The exclusion criteria were age below 18 years, dual sensory loss (deaf-blindness) requiring tactile communication, referral for reasons other than assessment and treatment of mental disorders, and acute, severe psychiatric or somatic illness. Some patients who were referred to the specialized psychiatric services for the DHH population were not primarily referred for the assessment and treatment of mental disorders. The presence of a specialist institution for DHH individuals likely results in an increased referral of patients with varying needs. However, in Norway, individuals with disorders diagnosed within the diagnostic categories intellectual disabilities and pervasive developmental disorders, are primarily
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assessed and treated in specialized habilitation services. Therefore, DHH adults with these diagnoses were not included in the current sample. Also, for ethical reasons, patients with acute, severe psychiatric (e.g., acute psychotic episode, severe traumatization after rape) or somatic illness (e.g., recently diagnosed cancer) who were considered unfit by the clinicians for study participation, were not asked to participate. This may have influenced the relative distribution of the disorders, and as noted above, contributed to a sample of patients with non-psychotic disorders.

Ten participants failed to attend their appointments, most likely because they suffer from a combination of mental and social problems. The loss of these participants may have caused bias to the current results, which is another limitation to the study. However, we have no information on how the participation of these patients might have influenced the data.

Some patients did not return the SCL-25; therefore there are missing data on symptoms of anxiety and depression. Missing SCL-25 data were more frequent among patients using sign language than among patients using spoken language. Some GAF scores were also missing. Whether the missing data have influenced the results, and in which direction, is unknown.

The SCL-25 is a self-report instrument and this assessment was not video recorded. Some patients asked their therapist for this assessment to be conducted as an interview in NSL because they had difficulties reading the questions. All clinicians were trained to present the questions in uniform NSL utterances according to the translated NSL version; however, misunderstandings may have occurred (as could have also happened when a patient read the SCL-25 questionnaire).

Clinical Implications

The present results indicate that the DHH patients who use sign language and those who use spoken language had similar needs for assessment and treatment. Additionally, the
patients who used spoken language were more vulnerable to medical disorders and social isolation. Clinicians may therefore need to assess possible stressors in the patients’ lives and how these affect their wellbeing. The assessment should cover both current and earlier sources of stress because what constitutes a stressful event may vary in different phases of life. Clinicians should also focus on revealing potential conditions leading to social isolation. Isolation may be both a source and a coping strategy related to social stress.

When recruiting patients for the current study, we unexpectedly found that nearly half of the referred patients used spoken language. This indicates that specialized services for the DHH population requires professionals to not only master sign language, but to have a broader competency combining expertise in psychiatry, clinical psychology, linguistics and communication science, as well as knowledge about the psychosocial consequences of hearing loss and deafness. Most general mental health services are unlikely to have this proficiency and may be unable to offer adequate assessment and treatment to the DHH patient population, even if they use the same language.

When assessing and treating DHH patients who use sign language, professionals are commonly aware and considerate of the need to secure mutual language and good communication. However, the need for special knowledge is more likely to be overlooked when interacting with DHH patients using spoken language. These patients may in fact need adaptations in the assessment and treatment sessions (e.g., amplification systems, special lighting conditions, and positioning in the room) for optimal communication and treatment to take place. Knowledge and skills to fulfill these requirements are found in the specialized services, but only occasionally among professionals in the general mental health services.

Ideally, general mental health practitioners should evaluate if they hold the knowledge and skills required to assess and treat DHH patients whether the patients use signed or spoken language. If they do not have these skills, they should refer the patients to a specialized
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service for the DHH population. This in turn requires knowledge of the existence of
specialized services and appropriate referral routines.

The DHH population who use spoken language is growing because newborn hearing
screening has been implemented, resulting in more cochlear implantations for children early
in life, most of whom are attending ordinary schools. Further research is needed regarding the
development of DHH children who use spoken language, and how childhood hearing loss
affects their wellbeing and psychosocial functioning, and to develop adequate interventions to
prevent stress-related disorders and social isolation. Future research should include
epidemiological and clinical studies of the mental health trajectories of the total DHH
population, and specific action should be taken to uncover the need for mental health services
in the DHH population who speaks the language of the majority society.

Conclusions

In our study’s sample of patients referred to specialized mental health services for the
DHH population, we found clinical and demographic differences between patients using NSL
and those speaking Norwegian. Medical comorbidity was significantly more prevalent in
DHH patients speaking Norwegian, and they tended to be more socially isolated and stressed.
However, the level of mental distress and daily functioning did not differ significantly
between the groups; neither did the distribution of mental disorders.

Competing Interests

The authors declare that they have no competing interests.
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doi:10.1093/deafed/enh014

persons with pre-lingual deafness using sign language: subjective wellbeing, ill-health
symptoms, depression and insomnia. *Archives of Gerontology and Geriatrics, 37*(1),
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### Table 1

**Demographic characteristics; total sample, and linguistic groups**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total sample, (N = 76)</th>
<th>NSL, (n = 40)</th>
<th>NL, (n = 36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of female participants</td>
<td>52 (68.4)</td>
<td>25 (62.5)</td>
<td>27 (75.0)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>37 (48.7)</td>
<td>21 (52.5)</td>
<td>16 (44.4)</td>
</tr>
<tr>
<td>Married/cohabiting, partner</td>
<td>31 (40.8)</td>
<td>15 (37.5)</td>
<td>16 (44.4)</td>
</tr>
<tr>
<td>Divorced, separated or widowed</td>
<td>8  (10.5)</td>
<td>4 (10.0)</td>
<td>4 (11.1)</td>
</tr>
<tr>
<td>Level of education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>9  (11.8)</td>
<td>4 (10.0)</td>
<td>5 (13.9)</td>
</tr>
<tr>
<td>High school and equivalent</td>
<td>44 (57.9)</td>
<td>25 (62.5)</td>
<td>19 (52.8)</td>
</tr>
<tr>
<td>University, lower degree</td>
<td>18 (23.7)</td>
<td>8 (20.0)</td>
<td>10 (27.8)</td>
</tr>
<tr>
<td>University, higher degree</td>
<td>5  ( 6.6)</td>
<td>3 ( 7.5)</td>
<td>2 ( 5.6)</td>
</tr>
<tr>
<td>Source of income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paid work and study loans</td>
<td>31 (40.8)</td>
<td>15 (37.5)</td>
<td>16 (44.4)</td>
</tr>
<tr>
<td>Social welfare and pension</td>
<td>45 (59.2)</td>
<td>25 (62.5)</td>
<td>20 (55.6)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>European/Caucasian</td>
<td>70 (92.1)</td>
<td>36 (90.0)</td>
<td>34 (94.4)</td>
</tr>
<tr>
<td>Asian</td>
<td>6  ( 7.9)</td>
<td>4 (10.0)</td>
<td>2 ( 5.6)</td>
</tr>
<tr>
<td>Age (years) at assessment</td>
<td>76  36.7 (14.3)</td>
<td>40  35.6 (12.3)</td>
<td>36  38.0 (16.3)</td>
</tr>
</tbody>
</table>

**Note:**
NSL = Norwegian Sign Language
NL = Norwegian language, with and without sign support
### Mental Disorders in Deaf and Hard of Hearing Adult Outpatients

#### Table 2

**Demographic variables related to hearing loss; total sample, and linguistic groups**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total sample, N=76</th>
<th>NSL, n=40</th>
<th>NL, n=36</th>
<th>(X^2(\text{df}))</th>
<th>Phi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of hearing loss&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard of hearing ≤80 dB</td>
<td>31 (40.8)</td>
<td>5 (12.5)</td>
<td>26 (72.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profoundly hard of hearing/deaf &gt;80 dB</td>
<td>45 (59.2)</td>
<td>35 (87.5)</td>
<td>10 (27.8)</td>
<td>25.56(1)&lt;sup&gt;**&lt;/sup&gt;</td>
<td>−.61</td>
</tr>
<tr>
<td>Hearing loss in the family</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>27 (37.5)</td>
<td>15 (37.5)</td>
<td>12 (37.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>45 (62.5)</td>
<td>25 (62.5)</td>
<td>20 (62.5)</td>
<td>0.00 (1)</td>
<td></td>
</tr>
<tr>
<td>Family’s language with patient in childhood</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Similar</td>
<td>26 (34.2)</td>
<td>6 (15.0)</td>
<td>20 (55.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Different</td>
<td>50 (65.8)</td>
<td>34 (85.0)</td>
<td>16 (44.4)</td>
<td>12.10(1)&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.43</td>
</tr>
<tr>
<td>Educational setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mainstream school</td>
<td>34 (44.7)</td>
<td>8 (20.0)</td>
<td>26 (72.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School for DHH children</td>
<td>42 (55.3)</td>
<td>32 (80.0)</td>
<td>10 (27.8)</td>
<td>18.84(1)&lt;sup&gt;**&lt;/sup&gt;</td>
<td>−.52</td>
</tr>
<tr>
<td>Main childhood residence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family home</td>
<td>44 (57.9)</td>
<td>17 (42.5)</td>
<td>27 (75.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential school</td>
<td>32 (42.1)</td>
<td>23 (57.5)</td>
<td>9 (25.0)</td>
<td>6.93 (1)&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.33</td>
</tr>
<tr>
<td>Etiology of hearing loss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infection in pregnancy</td>
<td>7 (9.2)</td>
<td>5 (12.5)</td>
<td>2 (5.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perinatal</td>
<td>7 (9.2)</td>
<td>2 (5.0)</td>
<td>5 (13.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningitis/infection in childhood</td>
<td>10 (13.2)</td>
<td>5 (12.5)</td>
<td>5 (13.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usher syndrome I &amp; II</td>
<td>6 (7.9)</td>
<td>3 (7.5)</td>
<td>3 (8.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other genetic/hereditary</td>
<td>24 (31.6)</td>
<td>15 (37.5)</td>
<td>9 (25.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury</td>
<td>2 (2.6)</td>
<td>0 (0.0)</td>
<td>2 (5.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown to patient</td>
<td>20 (26.3)</td>
<td>10 (25.0)</td>
<td>10 (27.8)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

<sup>a</sup>As defined by the World Health Organization

DHH = Deaf and hard of hearing

NSL = Norwegian Sign Language

NL = Norwegian language, with and without sign support

**p < .01**
Table 3
*Mental Disorders in Deaf and Hard of Hearing Adult Outpatients*

Table 3
*Main mental disorders, diagnosed by Mini International Neuropsychiatric Interview; total sample, and linguistic groups*

<table>
<thead>
<tr>
<th>Main diagnostic category according to ICD 10</th>
<th>Total sample, N=76</th>
<th>NSL, n=40</th>
<th>NL, n=36</th>
<th>$X^2$ (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol and drug-induced disorder</td>
<td>4 (5.3)</td>
<td>4 (25.0)</td>
<td>1 (2.8)</td>
<td></td>
</tr>
<tr>
<td>Psychotic disorder</td>
<td>1 (1.3)</td>
<td>1 (2.5)</td>
<td>0 (0.0)</td>
<td></td>
</tr>
<tr>
<td>Mood disorders</td>
<td>35 (46.1)</td>
<td>18 (45.0)</td>
<td>17 (47.2)</td>
<td></td>
</tr>
<tr>
<td>Neurotic disorders$^a$</td>
<td>29 (38.2)</td>
<td>13 (32.5)</td>
<td>16 (44.4)</td>
<td>0.076 (1)$^b$</td>
</tr>
<tr>
<td>Personality disorders</td>
<td>4 (5.3)</td>
<td>2 (5.0)</td>
<td>2 (5.6)</td>
<td></td>
</tr>
<tr>
<td>Mild intellectual disability</td>
<td>1 (1.3)</td>
<td>1 (2.5)</td>
<td>0 (0.0)</td>
<td></td>
</tr>
<tr>
<td>General psychiatric assessment</td>
<td>2 (2.6)</td>
<td>2 (5.0)</td>
<td>0 (0.0)</td>
<td></td>
</tr>
</tbody>
</table>

*Note:*

NSL = Norwegian Sign Language
NL = Norwegian language, with and without sign support

$^a$ Neurotic, stress-related and somatoform disorders

$^b$ Comparison of mood disorders and neurotic disorders
Table 4
Clinical characteristics; total sample, and linguistic groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total sample, N = 76</th>
<th>NSL, n = 40</th>
<th>NL, n = 36</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M   (SD)</td>
<td>n</td>
</tr>
<tr>
<td>Age (years) at onset of mental disorder</td>
<td>75</td>
<td>23.7 (15.5)</td>
<td>39</td>
</tr>
<tr>
<td>Anxiety, item score (SCL 25)</td>
<td>59</td>
<td>1.96 (0.58)</td>
<td>27</td>
</tr>
<tr>
<td>Depression, item score (SCL 25)</td>
<td>59</td>
<td>2.24 (0.58)</td>
<td>27</td>
</tr>
<tr>
<td>GAF F</td>
<td>70</td>
<td>56.9 (12.1)</td>
<td>37</td>
</tr>
<tr>
<td>GAF S</td>
<td>69</td>
<td>56.7 (10.0)</td>
<td>36</td>
</tr>
<tr>
<td>Medical comorbidity&lt;sup&gt;a&lt;/sup&gt;</td>
<td>N (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Yes</td>
<td>48 (63.2)</td>
<td>20 (50.0)</td>
<td>28 (77.8)*</td>
</tr>
<tr>
<td>Social isolation&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>36 (49.3)</td>
<td>14 (37.8)</td>
<td>22 (61.1)</td>
</tr>
</tbody>
</table>

Note:
- NSL = Norwegian Sign Language
- NL = Norwegian language, with and without sign support
<sup>a</sup>Diabetes, tinnitus, visual disorders, musculoskeletal disorders, migraine, injury, other illness
  \[ \chi^2 (1, n = 76) = 5.15 (1), p = .02, phi = .29 \]
<sup>b</sup>\[ \chi^2 (1, n = 76) = 3.08 (1), p = .08, phi = .23 \] with continuity correction