



# The initial evaluation of an Internet-based support system for audiologists and first-time hearing aid clients<sup>☆</sup>



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## ABSTRACT

**Objectives:** Audiologists provide professional contact and support between appointments to clients with hearing impairment using telephone and e-mail, but more advanced and flexible technological platforms are also possible. The present study aimed to evaluate the clinical application of an Internet-based support system for audiologists and their first-time hearing aid clients.

**Design:** An Internet-based support system developed by Månsson et al. (2013) for psychologists and their clients was adapted for audiologic purposes. Three audiologic clinics in Sweden tested the support system with their clients.

**Study sample:** Twenty-three clients managed by four audiologists used and evaluated the support system. In addition, five of the clients and all four audiologists were interviewed and their responses were analyzed using content analysis.

**Results:** The clients and the audiologists reported positive experiences and overall satisfaction but audiologists reported that the support system did not address the needs of all clients. More positive experiences and greater satisfaction with the support system were associated with reductions on self-reported consequences of hearing loss and positive hearing aids outcomes.

**Conclusions:** An Internet-based support system can be used in audiologic rehabilitation. Both audiologists and clients recognized the system's potential value to offer an online support to the provision of audiologic services.

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## 1. Introduction

Disabling hearing loss affects approximately 5% of the global population (WHO, 2015) and becomes more prevalent with age, affecting about 1/3 of the population aged over 65. Hearing loss affects both the individual's and significant others' physical and psychological health negatively which incurs costs for the individual and the society in general (Hjalte et al., 2012). Audiologic rehabilitation is the most common way to alleviate the effects of hearing loss. The rehabilitation process requires several visits including hearing and hearing needs assessment, counseling, client education, and fitting of hearing aids. Audiologist contact and support between appointments could provide more

continuous and timely care, improve information exchange, and facilitate the audiologic rehabilitation. With optimal accessibility in mind, such audiologist contact and support has been offered in a telephone format (Cherry and Rubinstein, 1994) and in an electronic mail format (Laplante-Lévesque et al., 2006). Other technological platforms are now available to offer this service. The present study reports on the clinical application of an Internet-based support system for audiologists and first-time hearing aid clients.

### 1.1. Tele-health

Tele-health adoption depends on technical as well as human factors: both clients and clinicians must be able and willing to use such applications. Research has focused largely on client- and clinician-specific predictors of adoption, rather than on social, organizational, or environmental factors (Or and Karsh, 2009). Theories of technology adoption have been used to explain tele-health adoption and inform the design

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and implementation of tele-health applications, both for clients and clinicians (e.g., Gagnon et al., 2003; Sun et al., 2013). Clinicians' opinions towards tele-health are central as they typically act as gate-keepers for tele-health adoption (Whitten and Mackert, 2005). Clients tend to be more satisfied with tele-health services than their clinicians (Kairy et al., 2009). Tele-health has been used to empower clients in various areas of health including chronic diseases where the client is encouraged to engage actively in their health and its management (Calvillo et al., 2014). Tele-health could also be applied to support the problem-solving process that is audiologic rehabilitation.

### 1.2. Tele-audiology

Internet use is prevalent among people with hearing impairment: independent studies from Canada, the United Kingdom, and Sweden all point towards greater Internet use in people with hearing impairment than in the general population of corresponding age (Gonsalves and Pichora-Fuller, 2008; Henshaw et al., 2012; Thorén et al., 2013). Several tele-audiology applications exist: for a systematic review, see Swanepoel and Hall (2010). Examples of tele-audiology applications of particular interest for audiologic rehabilitation include educational program with telephone consultations for hearing aid users (Lundberg et al., 2011a, 2011b; Malmberg et al., 2015), hearing information search on the Internet (Laplante-Lévesque et al., 2012), Internet-based audiologic rehabilitation (Thorén et al., 2011; Kaldo et al., 2013; Thorén et al., 2014), and Internet-based peer support groups (Cummings et al., 2002). However, the combination of Internet-delivered support and face-to-face appointment has not been tested.

Limited information on audiology clients' experiences of tele-audiology is currently available, except for Eikelboom and Atlas (2005) who found that the majority of Australian audiology clients did not know about tele-medicine. However, clients were interested in tele-audiology to reduce waiting times and costs, but a common barrier for using it was that they preferred face-to-face appointments (Eikelboom and Atlas, 2005). Also, hearing aid users with severe forms of hearing loss cannot easily use the telephone but can do better if using video chat programs instead of the telephone (Mantokoudis et al., 2012). The client attitudes towards and interest in tele-audiology applications suggest that a combination of tele-audiology and face-to-face appointments may increase client satisfaction with the audiologic rehabilitation. Also, tele-audiology accessible through so-called smart mobile phones has the potential to improve accessibility even more by removing geographical and temporal barriers (Silva et al., 2015). The perceptions and experiences of audiologists regarding tele-audiology are also largely unknown (Swanepoel and Hall, 2010). However, Singh et al. (2014) surveyed hearing health care practitioners in Canada. They reported that a majority of audiologists and hearing instrument specialists had contact with both clients and colleagues through electronic mail but less than 4% had used videoconferencing services. Also, Singh et al. (2014) reported that the attitudes towards tele-audiology were overall neutral and the majority of the sample thought it would not have large impact on professional practice or improve the quality of the services provided. Based on these findings together, it would be of value to evaluate the implementation of tele-audiology applications in clinical practice from both the client and the audiologist point of views as many clients believe that they could benefit and the fact that audiologists experience more custom-made tele-audiology applications in clinical practice seems negligible.

### 1.3. Internet-based support system for audiologists and first-time hearing aid clients

Car et al. (2012) listed considerations for the effective development of tele-health interventions for people with chronic health conditions. This includes being grounded in a disease management strategy, addressing client needs, and using a technological platform that is suitable

for the application aims. In line with these considerations, Månsson et al. (2013) developed an Internet-based support system for face-to-face cognitive behavior therapy (CBT) for patients with common anxiety and depression disorders. The system included components of CBT such as a library of interventions gathered from existing Internet-delivered CBT interventions (Andersson et al., 2002; Andersson et al., 2005; Andersson et al., 2006). As tailored interventions seems to be more effective than standardized interventions (Johansson et al., 2012), the support system content was tailored for each client. The system was tested with 15 clients and found to be effective in reducing anxiety and depressive symptoms. In the present study, the Internet-based platform (support system) of Månsson et al. (2013) was adapted for audiologic purposes and the concept of Internet-delivered support in combination with face-to-face appointment was tested at the clinic.

### 1.4. Research aims

The present study aims to evaluate the clinical application of an Internet-based support system for audiologists and their first-time hearing aid clients. This is done in two steps: First, it examines the associations between the usage of an Internet-based support system for audiologists and first-time hearing aid clients and a hypothesized reduction in self-reported consequences of hearing loss, improvement in hearing aid self-efficacy, and hearing aid outcomes commonly seen after hearing aid fitting. Second, it describes how both audiologists and clients used and experienced the support system.

## 2. Materials and methods

Using the framework and fundamental functions of the Internet-based platform by Månsson et al. (2013), four research audiologists adapted the content of the support system for audiologic purposes. The audiologists tested the system and revised its content and functions in an iterative process. The development process, functions, and content of the support system are described elsewhere (Brännström et al., 2015). In the present study, four clinical audiologists used and evaluated the final version in three audiologic clinics in Sweden.

The four clinical audiologists worked in three public tax-funded Swedish hospitals: Linköping University Hospital, Norrköping Hospital, and Värnamo Hospital. These clinical audiologists were those who agreed to participate after informal contacts. In Sweden, hearing assessments and hearing aid fittings are provided by audiologists. Swedish audiologists have a bachelor degree in audiology and are licensed by the National Board of Health and Welfare to practice audiology. Swedish audiologic services have historically been a public service provided by tax-funded hospitals. Also today most audiologic services in Sweden are provided through the public sector. There are some regional differences where private practitioners may receive some financial compensation for the fitting of hearing aids. These private practitioners are also allowed to sell hearing aids to clients as a private company. Generally, a client needs to pay about USD100 for the access to services, hearing aids included, when utilizing the publicly funded system. When a client seeks help for hearing problems they usually attend about three or four appointments lasting approximately 1 h each. Hearing assessments are made at the first visit. At the second visit, a rehabilitation plan is made by the audiologist based on a discussion with the client on the specific needs and goals of the client. Commonly hearing aids are fitted, information on user expectations and instructions are provided often along with information on communication strategies. At the third and fourth visits fine tuning of the hearing aids is made if required and additional support is provided if warranted. Details on the Swedish hearing health care services are available in Brännström et al. (2013).

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