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## Factors Involved in Access and Utilization of Adult Hearing Healthcare: A Systematic Review

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### Abstract

**Objective/Hypothesis**—Hearing loss is a public health concern yet hearing healthcare disparities exist and influence utilization of rehabilitation services. The objective of this review was to systematically analyze the published literature on motivators, barriers, and compliance factors affecting adult patient access and utilization of hearing rehabilitation healthcare.

**Data Sources and Study Eligibility Criteria**—Pubmed, PsychINFO, CINAHL, Web of Science were searched for relevant articles. Eligible studies were those containing original, peer-reviewed research in English pertaining to factors affecting adult hearing healthcare access and utilization of hearing aids and cochlear implantation. The search encompassed 1990-2015.

**Study Appraisal and Synthesis Methods**—Two investigators independently reviewed all articles and extracted data. Specific variables regarding access to care and compliance to recommended care were extracted from each study.

**Results**—Thirty articles were reviewed. The factors affecting access and utilization of hearing rehabilitation could be classified into motivators, barriers, and compliance in treatment or device use. The key motivators to seek care include degree of hearing loss, self-efficacy, family support, and self-recognition of hearing loss. The primary barriers to care were financial limitations, stigma of hearing devices, inconvenience, competing chronic health problems, and unrealistic expectations. Compliance is most affected by self-efficacy, education level, and engagement in the rehabilitation process.

**Conclusion**—Accessing hearing healthcare is complicated by multiple factors. Considering the current climate in healthcare policy and legislation towards improved access of care, a deeper

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understanding of motivators, barriers and compliance factors can aid in delivery of effective and efficient hearing healthcare.

### Keywords

Hearing healthcare; Access to care; Systematic review

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## INTRODUCTION

Hearing impairment is a common, chronic condition affecting a large portion of the population in the United States. According to the Centers for Disease Control and Prevention (CDC), hearing loss is rated as the top third chronic condition affecting Americans with only hypertension and arthritis ranked higher.<sup>1</sup> Over 30 million people experience some degree of hearing loss in one or both ears, including up to 63% of those over 70 years of age.<sup>2</sup> In spite of the high prevalence of hearing loss, utilization of diagnostic and therapeutic hearing healthcare is limited. Even when patients undergo appropriate hearing screening and referral in primary care clinics, there is evidence indicating poor adherence to recommended treatment.<sup>3,4</sup> For example, adults with hearing loss typically wait 10 years to seek rehabilitation assistance after first experiencing hearing loss.<sup>5</sup> Additionally, only 24.8% of those who need hearing aids actually receive them.<sup>6</sup> Poor utilization of hearing rehabilitation is also evident in those patients with more severe forms of hearing loss. Approximately 1.2 million patients are likely candidates for cochlear implantation in the United States, but the utilization rate of this technology is only 5%.<sup>7</sup>

Untreated hearing loss causes a measurable impact to the social, occupational, and emotional well-being of adults.<sup>8,9</sup> Those experiencing hearing problems are more prone to having anxiety and depressive symptoms and are likely to experience feelings of social inferiority and irritability.<sup>10</sup> Hearing impairment in adults is also associated with an increase in depression by at least 50% compared to adults with normal hearing.<sup>11</sup> In general, poorer quality of life is linked with hearing impairment.<sup>12</sup> As the life expectancy in the U.S. continues to climb, the health burden of chronic disease would be expected to increase substantially, making prompt recognition and intervention essential.

Recent changes in general healthcare policy and legislation has caused a surge in interest and research in the realm of access to healthcare. In 2012, the United States' Supreme Court enacted the Affordable Care Act, which gives all Americans access to general healthcare insurance regardless of pre-existing conditions.<sup>13</sup> Public health policy also recognizes the importance of hearing healthcare. Healthy People 2020, a preventative health initiative of the United States Department of Health and Human Services, identify increasing hearing healthcare utilization, including increased use of hearing aids and cochlear implantation for appropriate candidates, as a priority.<sup>14</sup> However, the factors affecting the access and utilization for adults seeking hearing rehabilitation are not well understood. The objective of this research was to systematically analyze the published literature on factors affecting adult patient access and utilization to hearing rehabilitation healthcare involving hearing aids and cochlear implants. The specific question addressed by this systematic review was: What are

the motivators, barriers, and compliance factors involved in accessing or utilizing rehabilitative hearing healthcare services for adult patients with hearing loss?

## METHODS

### Search Strategy

This study was exempt from the University of Kentucky Institutional Review Board approval. The specific question addressed by this systematic review was: What are the influences or impediments to accessing or utilizing rehabilitative hearing healthcare services for adult patients with hearing loss. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) checklist was used to guide this systematic review.<sup>15</sup> Access to care is a broad topic and we chose to focus this review on original research reporting on motivators, barriers and compliance factors involved in adult hearing loss rehabilitation. A specific outcome measure was not required for inclusion in this review. The specific inclusion criteria included: 1) articles related to hearing impairment rehabilitation, 2) articles reporting data on motivators, barriers, and compliance factors, and 3) articles with an adult population (>18 years of age). Exclusion criteria included: 1) Case reports or non-original research and 2) language other than English. A search strategy was developed using The National Library of Medicine's (NLM) medical subject heading (MeSH) browser in expanded concept view to identify MeSH indexed search terms (<http://www.nlm.nih.gov/mesh/MBrowser.html>). In an attempt to capture articles inclusive of the study objective, MeSH terms associated with hearing impairment, hearing disorders, hearing aids and cochlear implants coupled with access to care, patient acceptance of healthcare and healthcare disparities were identified. Once these terms were identified, an overarching search string was created. Figure 1 lists terms utilized in the search string as well as the algorithm for inclusion/exclusion.

An initial overarching search was conducted in PubMed, utilizing the MeSH search string. [All Fields] was employed for assurance that all relevant articles including the search criteria were identified through the search so not to limit where the MeSH indexed terms were captured (as indexed, in title and in body of article). Searches were limited to English articles published in the last twenty-five years (1990-2015). The original search was performed in April 2015. Next, searches using the same terms were conducted in PsychINFO, CINALH, and Web of Science. Additional publications were identified through the review of the references cited in these publications and augmented with directed search of journals addressing hearing loss and hearing healthcare through February 2016.

### Data Extraction

Article titles and abstracts were reviewed independently by 2 reviewers and were selected or removed based on the inclusion and exclusion criteria. In the event of disagreement over inclusion, the article was included for full text review to be more inclusive. A full-text review of all eligible articles was completed independently by the reviewers and the bibliographies of these articles were examined to identify additional articles. Hearing healthcare journals in audiology and otolaryngology were also independently searched by each reviewer and the senior author to identify any additional articles missed by the search

string. After full text review, any disagreement regarding article inclusion in the final review between reviewers was resolved by obtaining a majority consensus among the 2 reviewers and the senior author (MLB). Ultimately, there was no disagreement among the reviewers regarding of the final list of articles included in the review. The two reviewers independently analyzed the articles and identified reported motivators, barriers, and compliance factors in hearing healthcare. This data was recorded separately and organized into tables. The level of evidence of each article was also assessed according to the Oxford Centre for Evidence-based Medicine guidelines (<http://www.cebm.net/oxford-centre-evidence-based-medicine-levels-evidence-march-2009/>) since this grading system addresses levels of evidence.<sup>16</sup> The risk of bias for quantitative research studies was determined using the Cochrane Collaboration's tool for assessing risk of bias.<sup>17</sup> This assesses bias based on the presences of randomization, blinding, treatment standardization, outcome standardization, follow-up standardization, and completeness of data reporting. The studies were considered low bias risk if all aspects were addressed, moderate risk if at least 3 were addressed, and high risk if less than 3 were addressed. Qualitative research article quality was assessed using the Critical Appraisal Skills Programme, which has been utilized by the Cochrane Collaboration.<sup>18</sup>

## RESULTS

The initial search in PubMed yielded a total of 764 articles. Additional searches using the same search terms were conducted yielding 142 articles from PsychINFO, 246 articles from CINALH, and 2 articles from Web of Science giving a total of 1154 articles. After title and abstract review, 1009 articles were excluded. A full-text and bibliography review of the 145 remaining articles was completed. Twenty-four articles met the inclusion criteria and were eligible for systematic review. Six additional articles were identified through the bibliography search and search of hearing-related journals and included in the review. The 30 articles included in the review are summarized in Table 1, with inclusion of the level of evidence. In review of the articles related to access and utilization of healthcare, data pertaining to the 3 primary themes (motivators in accessing care, barriers to accessing care, and compliance factors affecting hearing loss treatment) were recorded. This data is summarized in Table 2. A common statistical measure was not found between all the research articles selected for inclusion thus a meta-analysis was not conducted.

### Motivators

Seventeen articles were identified which addressed motivators in seeking hearing rehabilitation healthcare. Audiological factors that lead to a patient's pursuit of hearing healthcare include a higher degree of hearing loss (based on a four-frequency average), longer length of time experiencing hearing problems, difficulty understanding speech in the presence of background noise, and difficulty understanding speech on the television.<sup>19-21</sup> Relatedly, those who perceived more severe hearing problems were more likely to pursue interventions.<sup>22-27</sup> Also, the more activity limitations a person with hearing loss endures and the higher self-perception of disability faced by participants, the higher probability that they will seek to obtain a hearing aid.<sup>19,21,24,28</sup> Patients who had more self-recognition and acceptance of the hearing problem were more willing to use a hearing device.<sup>24,29,30</sup>

Healthcare providers also play an important role in the process of seeking hearing care.<sup>31</sup> Otolaryngologists are frequently the initial contact in motivating a patient to seek intervention for hearing problems, and two-thirds of patient recommended to undergo audiological assessment proceed with the recommendation.<sup>32</sup>

Non-audiological patient behavioral factors were also identified as motivators in seeking hearing healthcare. Patient's perception of receiving benefit from care,<sup>22</sup> and an appeasement of others and/or an acceptance of responsibility for the communication breakdowns in family life leads to pursuit of hearing intervention.<sup>20</sup> Patient's families and acquaintances are strong external motivators to seek hearing intervention.<sup>23,32,33</sup> Conversely, one study found that people who live alone use hearing aids more than those who live with others.<sup>28</sup> Those in a higher socioeconomic status were more likely to not only pursue a hearing consultation but more likely to use a hearing aid.<sup>24</sup> Appointment convenience factors such as time, office location, schedule, travel time, and ease of access to the facility all influence a patient's motivation to seek hearing healthcare.<sup>29</sup>

Psychological factors are also important to consider in the context of help-seeking behavior. Hearing healthcare seekers are more pragmatic and routine-oriented compared to typical adults.<sup>34</sup> Additionally, people who experience more psychological strain from the hearing loss, and those having a high willingness to seek intervention and to use hearing technology, were more likely to uptake hearing aids.<sup>23,25</sup> A high level of self-efficacy, or one's confidence in the ability to access care, was identified as a key motivator in adults with hearing loss in need of intervention<sup>19</sup>; furthermore, patients' level of self-efficacy is correlated with success in hearing aid use.<sup>35</sup>

## Barriers

Twenty-two articles were identified which explore the barriers patients face when actively seeking and/or considering access to hearing healthcare from both the perspective of patients and healthcare professionals. Audiological barriers to seeking hearing healthcare include minimization and/or denial of the problem, minimal degree of hearing loss, and inconvenience (time, location, schedule, travel time, ease of access).<sup>26,29,36</sup> People who have not had their hearing tested recently or who have never had their hearing tested are less likely to use hearing aids.<sup>26,37</sup>

Cultural beliefs and support may also influence help-seeking behavior. The lack of motivation and support from family/friends limits seeking of hearing healthcare.<sup>26</sup> Among those with hearing loss, participants within minority groups were less likely to obtain hearing aids compared to a Caucasian population.<sup>28</sup> One study regarding race and ethnicity found a discrepancy between diagnostic testing and treatment. Specifically those within minorities are more likely to get their hearing evaluated, yet least likely to seek treatment following a hearing loss diagnosis.<sup>38</sup> Cultural discrepancies may be related to insurance coverage, income, and/or geographical location considerations.<sup>38</sup> Non-audiological factors, such as socioeconomic status<sup>25,29,32,37</sup> and insurance coverage can act as a barrier to care.<sup>39</sup> Limited financial means of patients was a recognized barrier in multiple countries represented in these articles.<sup>26, 29,37,40</sup>

Psychological factors, cognitive dysfunction, and medical conditions of people with hearing loss may also be barriers. Stigma, due to hearing aid use, and the perception of social negativity towards communication difficulties are psychological barriers to seeking hearing healthcare.<sup>22,25,26</sup> Some patients report a fear of compromising their social identity with the use of hearing aids; however, untreated hearing loss causes some to withdraw from social interactions.<sup>20</sup> Adults greater than 60 years old perceive significant stigma related to hearing impairment, because they attribute hearing aids as being associated with ageism and disability.<sup>41</sup> Patients with personalities characterized as anxious, tense, irritable, and neurotic by personality profile or who may have poorer cognitive function are less likely to obtain hearing aids.<sup>34,36</sup> Visual disabilities and the presence of an underlying anxiety disorder may result in less self-efficacy for seeking hearing loss intervention.<sup>35</sup> Furthermore, those with more serious competing health conditions are less likely to receive timely hearing healthcare.<sup>36,42</sup> The presence of tinnitus is associated with poorer hearing aid uptake.<sup>26</sup>

### Compliance Factors

Six articles identified in the review examine compliance with the recommended rehabilitation plan and ongoing use of a hearing device. Five studies focused on hearing aid post-fitting care, while one examined cochlear implantation follow-up care. Based on a descriptive survey, patients reportedly preferred receiving ongoing hearing healthcare from a private practitioner due to the efficiency of encounters with them.<sup>43</sup> Considering compliance, four factors positively correlated with ongoing hearing aid use: positive support from significant other, higher perceived handicap resulting from the hearing loss, positive attitude towards hearing help, and higher levels of perceived self-efficacy towards hearing aids.<sup>44</sup> The greater the self-efficacy of patients the better their help-seeking experience was and the longer they wore hearing aids.<sup>35</sup> Satisfaction with care received is associated with compliance and is inversely related to the cost of care, specifically hearing aids.<sup>34</sup> Conversely, patients who have received free hearing aids through government funding and who are not bothered by their hearing loss were less likely to be compliant with regular hearing aid use.<sup>45</sup> New users with unrealistic expectations are less satisfied than experienced users having realistic expectations.<sup>46</sup> One study focused on a Veteran population and the following predict post-fitting hearing aid satisfaction and continued use: greater handicap perceived at baseline measured with HHIE (Hearing Handicap Inventory for the Elderly), greater degree of high frequency hearing loss, younger age, less education, lesser degree of SRT (speech reception threshold) gain, less medication use, and better near-sighted vision.<sup>32</sup>

Compliance with audiological rehabilitation following cochlear implantation influences patient outcomes and is affected by a variety of factors. Cochlear implant recipients who are not fully engaged in the rehabilitation process have poorer speech perception outcomes.<sup>47</sup> Patients who have other health problems or who live in a rehabilitation/long-term care facility are less likely to be compliant in programming follow-up appointments, which may negatively affect their speech perception.<sup>47</sup> Those patients with a lower socioeconomic and education status are less compliant with programming appointments and have lower speech perception gain.<sup>47</sup>



## DISCUSSION

Improving access to hearing healthcare is a national priority.<sup>14</sup> Access to care is a complex concept and is influenced by many factors related to the patient, providers and the medical/audiological infrastructure. Understanding the motivating factors, underlying barriers, and compliance predictors for hearing healthcare can aid in improving existing systems and in designing effective interventions for patients. Multiple barriers to timely general healthcare exist for vulnerable populations with lower educational and socioeconomic status, which may be due to a complex interaction of cultural factors.<sup>48</sup> Although this review did not identify clear geographic differences, rural populations experience challenges in access to healthcare. Patients from rural areas may fear seeking specialized healthcare due to a perception that confidentiality in receipt of care could be compromised.<sup>48</sup> Also, transportation difficulties may deter patients from remote areas from seeking hearing healthcare; however, social support and gainful employment may mitigate transportation barriers.<sup>49</sup> Financial constraints have been found to be a significant barrier for hearing healthcare for rural and other vulnerable populations.<sup>49</sup> Lack of or inadequate insurance coverage may also affect general healthcare accessibility.<sup>50</sup> Based on the systematic review presented here, many barriers that present for general healthcare may also affect access to hearing healthcare.

Overall, there is limited research regarding cochlear implantation access and factors affecting the timing of cochlear implantation. Earlier implantation after the onset of severe hearing loss can lead to better speech understanding post-implantation; yet barriers exist to expeditious implantation.<sup>51</sup> Lower socioeconomic status and insurance coverage gaps for implantation services can negatively influence the ability to seek intervention.<sup>39,52</sup> Follow-up care following a cochlear implantation surgery may also be affected, specifically, those cochlear implant recipients who have poor health, live in a rehabilitation facility, and who are within a lower socioeconomic status or have less education result in less benefit from a cochlear implant than those who do not have these factors working against them.<sup>47</sup>

In most cases, hearing healthcare is sought on an elective basis, similar to visual healthcare. Research along these same lines for visual healthcare services also pinpoints transportation and financial limitations as barriers to access to care for vulnerable populations.<sup>53</sup> Disadvantaged groups, such as rural patients, face limited numbers of providers in remote regions resulting in limited numbers of referrals to specialists to meet the rural population's chronic condition intervention needs.<sup>54</sup> There is an alarming shortage of hearing healthcare specialists with cochlear implant experience with only 8% of audiologists in the United States providing cochlear implant services as a part of their practice.<sup>55</sup> Different models of service delivery have been investigated for certain healthcare specialties to address disparities such as these. A community-based model of delivery of rural optometry elective services has been investigated to address limitations in access to care.<sup>53</sup> This model requires the presence of local resource infrastructure that depends on multiple organizations, agencies, and resources to properly execute intervention services.<sup>53</sup>

There are multiple limitations of this review as well as the articles included in the review. In spite of thorough search criteria, it is possible that relevant articles were excluded from this

review. Outcome reporting bias is also a limitation of this review but this was reduced by using a protocol such that our hypothesis and methods were determined *a priori* to the knowledge of the results. There is a moderate to high risk of bias within these articles due to the nature of the study design of most of the articles (primarily retrospective and prospective cohort designs along with qualitative research). Most studies involved in some way a pilot project designed to examine a population. Because of this selection bias and publication bias were present. Potential biases were reduced in our interpretation of the data by employing a systematic approach to our search strategy outlined above. Conclusions drawn from this systematic review are limited given that a meta-analysis could not be performed due to the lack of consistent outcome measures among these studies. Comparisons between studies were difficult due to the diversity of articles and the lack of focused population-based research in these articles. Furthermore, the nature of the research was heterogeneous, thus making comparisons between studies difficult. In spite of extensive effort, the search criteria that were selected may not have included all original research that addresses adult hearing healthcare. The findings regarding motivating factors, barriers of access to care, and compliance factors may differ widely for various populations therefore limiting the generalizability of the findings. It is quite possible that these results may underestimate the barriers encountered by patients within areas of healthcare disparity due to a lack of focused research on vulnerable populations. Also, the studies included a generational gap as this review spans from 1990-2016. Motivators, barriers, and compliance to care may be influenced by generational knowledge and beliefs. This study was designed to provide insight regarding access to care by examining motivators, barriers, and compliance factors related to hearing healthcare.

## CONCLUSIONS

Access to healthcare is a complex matter. Three factors, motivators, barriers, and compliance of care, are outlined in this review. Existing systems of hearing healthcare delivery and effective interventions may show improvement when these factors are taken into consideration. Future efficacy research regarding methods for highlighting motivation, overcoming barriers, and ensuring compliance is important in order to guide hearing healthcare providers on proper interventions and rehabilitation guidelines.

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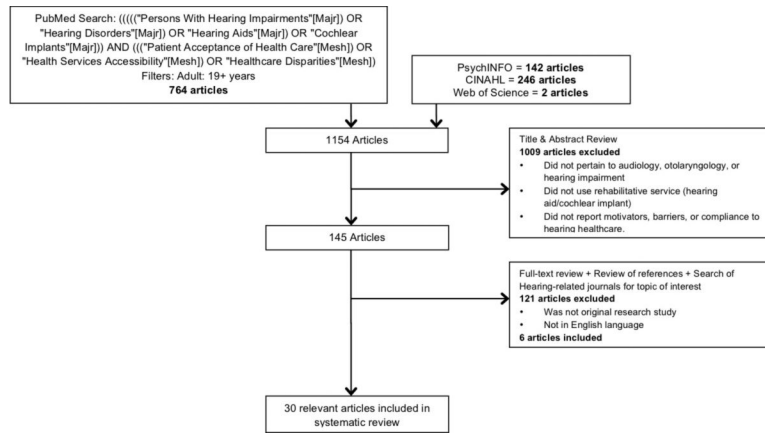
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**Figure 1.** Preferred reporting items for systematic review and meta-analysis algorithm

**Table 1**

Descriptions of the results of the selected studies.

Author (Year)	Country	Nature of Research	Level of Evidence	Inclusion/Exclusion Criteria?	Sample	Findings	Risk of Bias
Nieman, (2016) <sup>38</sup>	US	1	3b	Y	1,544 adults over age 70	-	H
Francis, et al. (2015) <sup>47</sup>	US	1	4	Y	219 cochlear implant recipients	- ***	H
Meyer, et al (2014) <sup>35</sup>	AUS	1	2b	Y	147 non-hearing aid users, 160 hearing aid users	+ - ***	M
Meyer, et al (2014) <sup>19</sup>	AUS	1	2b	Y	147 non-hearing aid users, 160 hearing aid users	+	M
Hickson, et al. (2014) <sup>44</sup>	AUS	1	2b	Y	75 unsuccessful hearing aid users, 85 successful hearing aid users	**	M
Bainbridge, et al. (2014) <sup>37</sup>	US	1	3b	Y	601 hearing-impaired adults	-	H
Abdellaoui, et al. (2013) <sup>32</sup>	France	1	3b	Y	184 hearing-impaired adults	+ -	H
Claesen, et al. (2012) <sup>20</sup>	UK	2	N/A	Y	6 adults seeking hearing healthcare	-	N/A
Lin, et al. (2012) <sup>51</sup>	US	1	4	Y	83 cochlear implant recipients	-	H
Laplante-Lévesque, et al. (2012) <sup>40</sup>	DK; AUS	1	2b	Y	153 hearing-impaired adults	+ -	M
Öberg, et al. (2012) <sup>36</sup>	Sweden	1	3b	Y	346 adults	-	H
Laplante-Lévesque, et al. (2011) <sup>56</sup>	DK; AUS	1	2b	Y	139 hearing-impaired adults	+ -	M
Laplante-Lévesque, et al. (2010) <sup>29</sup>	AUS	2	N/A	Y	22 hearing-impaired adults	+ -	N/A
Waillhagen (2010) <sup>41</sup>	US	2	N/A	Y	84 dyads (communication partner pair)	-	N/A
Meister, et al. (2008) <sup>25</sup>	GY	1	3b	Y	100 hearing-impaired adults	+ -	H
Grutters, et al. (2008) <sup>43</sup>	NL	1	3b	Y	150 hearing-impaired adults	***	H
Kochkin (2007) <sup>26</sup>	US	1	3b	Y	2,057 hearing aid users, 2,169 non-hearing aid users	+ -	H
Grutters, et al. (2007) <sup>31</sup>	NL	2	N/A	Y	60 healthcare providers, 332 hearing-impaired adults	+	N/A
Cox et al. (2005a) <sup>34</sup>	US	1	3b	Y	230 hearing-impaired adults	+ -	H

Author (Year)	Country	Nature of Research	Level of Evidence	Inclusion/Exclusion Criteria?	Sample	Findings	Risk of Bias
Cox, et al. (2005b) <sup>42</sup>	US	1	2b	Y	151 public health hearing aid users, 79 private practice hearing aid users	- **	M
Bille, et al. (2003) <sup>46</sup>	DK	1	3b	Y	384 hearing-impaired adults	**	H
Duikvestijn, et al. (2003) <sup>23</sup>	NL	1	3b	Y	1419 adults 55 or older	+	M
Garber, et al. (2002) <sup>39</sup>	US	1	2c	Y	131 Physicians, 111 Audiologists, 60 Hospitals, 44 Medicaid agencies	-	H
Tomita, et al. (2001) <sup>28</sup>	US	1	3b	Y	227 hearing-impaired adults, 495 frail elderly adults without hearing impairment	+ -	H
Brooks & Hallam (1998) <sup>45</sup>	UK	1	2b	Y	135 first-time hearing aid candidates	-	M
Popelka, et al. (1998) <sup>24</sup>	US	1	2b	N	1,629 hearing-impaired adults	+	M
van den Brink, et al. (1995) <sup>22</sup>	UK	1	3b	N	624 randomly selected adults	+ -	H
Mahoney, et al. (1996) <sup>33</sup>	UK	2	N/A	N	95 first-time audiology patients	+	N/A
Murlow, et al. (1992) <sup>27</sup>	US	1	3b	Y	95 veterans (HA group) 99 veterans (waiting list group)	+	H
Swan, et al. (1990) <sup>21</sup>	UK	1	3b	Y	163 consultants (self-sought hearing help), 286 non-consultors (did not seek help for hearing loss)	+ -	H

AUS=Australia, US=United States, UK=United Kingdom, DK=Denmark, GY=Germany, and NL=Netherlands. Motivators (+), Barriers (-), & Compliance of Care (\*\*); Rows having a gray background pertain solely to cochlear implantation. Nature of research: Quantitative (1) or Qualitative (2). Risk of bias assessed as high (H), moderate (M), or low (L).



**Table 2**

Factors related to motivation, barriers, and compliance of care.

Motivators to Seeking Hearing Healthcare Services		
Non-Audiological Factors	Audiological Factors	Psychological Factors
<ul style="list-style-type: none"> <li>• Self-perception of benefit of hearing<sup>22</sup></li> <li>• Family/Social support<sup>23,32,33</sup></li> <li>• Lifestyle<sup>28</sup></li> <li>• Appraisal of others<sup>20</sup></li> <li>• Acceptance of communication problems,<sup>20</sup></li> <li>• Socioeconomic status (Direct relationship)<sup>24</sup></li> <li>• Appointment convenience<sup>29</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Degree of hearing problem<sup>19,27</sup></li> <li>• Length of time with hearing loss<sup>19,21</sup></li> <li>• Degree of speech understanding difficulty<sup>19,21</sup></li> <li>• Limitation of activity<sup>19,21,24,28</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Personality,<sup>34</sup></li> <li>• High psychological strain from the hearing loss,<sup>23,25</sup></li> <li>• Willingness to wear hearing aids,<sup>23,25</sup></li> <li>• Self-efficacy,<sup>19,35</sup></li> <li>• Self-recognition of problem,<sup>24,29,30</sup></li> </ul>
Barriers to Seeking Hearing Healthcare Services		
Non-Audiological Factors	Audiological Factors	Psychological Factors
<ul style="list-style-type: none"> <li>• Financial limitations/SES status<sup>25,26,29,32,37,40</sup></li> <li>• Lack of insurance coverage<sup>39</sup></li> <li>• Visual disabilities<sup>35</sup></li> <li>• Anxiety disorder<sup>35</sup></li> <li>• Co-existing health conditions<sup>36,42</sup></li> <li>• Cultural/Racial/Ethnic factors<sup>29</sup></li> <li>• Family and friends' shared experiences<sup>29</sup></li> <li>• Lack of motivation/support from family/friends<sup>26</sup></li> <li>• Inconvenience<sup>26,29,36</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Presence of tinnitus<sup>26</sup></li> <li>• Minimization and/or denial of the problem<sup>26</sup></li> <li>• Degree of hearing loss (Inverse relationship)<sup>36,56</sup></li> <li>• Cost of hearing healthcare<sup>26</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Stigma<sup>22,25,26,41</sup></li> <li>• Social identity<sup>20</sup></li> <li>• Personality<sup>34</sup></li> <li>• Poor cognitive function<sup>36</sup></li> <li>• Negative attitude and unrealistic expectations<sup>25,26</sup></li> </ul>
Compliance to Hearing Healthcare Recommendations		
Non-Audiological Factors	Audiological Factors	Psychological Factors
<ul style="list-style-type: none"> <li>• Efficient care<sup>43</sup></li> <li>• Positive support from significant other<sup>44</sup></li> <li>• Higher perceived handicap<sup>44</sup></li> <li>• Positive attitude<sup>44</sup></li> <li>• Self-efficacy<sup>35,44</sup></li> <li>• Free hearing healthcare services<sup>45</sup></li> <li>• Age<sup>27,47</sup></li> <li>• Education level and SES<sup>27,47</sup></li> <li>• Medication use<sup>27</sup></li> <li>• Vision loss<sup>27</sup> and Health problems<sup>47</sup></li> <li>• Long-term care facility residence<sup>47</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Handicap perceived at baseline<sup>27</sup></li> <li>• Degree of high frequency hearing loss<sup>27</sup></li> <li>• Degree of SRT (speech reception threshold) gain<sup>27</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Unrealistic expectations<sup>46</sup></li> <li>• Level of engagement into the rehabilitation process<sup>47</sup></li> </ul>