### Table Supplementary Digital Context 1: Summary of the Results of the 16 Studies Included in this Review.

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Training</th>
<th>Frequency</th>
<th>Outcome</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Abrams et al., 2015</strong>&lt;br&gt;Effect of remotely delivered AT program for new hearing aid users.</td>
<td>Novel HA users&lt;br&gt;AT group n=15 control group n=14 randomization</td>
<td>Auditory training (ReadMyQuips) with audio-visual cross-word puzzles</td>
<td>30min/session 5 days/week for 3 weeks (15 sessions)</td>
<td>HINT: no group difference&lt;br&gt;- Words in noise test: no group difference&lt;br&gt;- Intensity of AT was positively correlated with increase in speech perception (WIN)</td>
<td>NA</td>
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<td><strong>2. Anderson et al., 2013 (in PNAS)</strong>&lt;br&gt;Effects of auditory-based cognitive training (BrainFitness) on neural timing and speech perception in elderly subjects.</td>
<td>NH + HL: PTA ≤45 dB HL&lt;br&gt;1. AT group (n=35)&lt;br&gt;2. Control group (n=32) pseudo-randomized&lt;br&gt;n= 67 38 females 55 - 70 years</td>
<td>Auditory-cognitive training (BrainFitness): Vowel transitions in linguistic contexts (syllables, words, sentences, stories.)&lt;br&gt;Control: watched a series of educational movies and answered related questions afterwards</td>
<td>1h/session 5 days/week for 8 weeks (40 sessions)</td>
<td>AT group improvement:&lt;br&gt;- QuickSIN&lt;br&gt;- Auditory short-term memory&lt;br&gt;- Processing speed&lt;br&gt;- Neural timing (noise condition)&lt;br&gt;- Neural variability reduced (noise condition)&lt;br&gt;- Noise-induced timing shifts pre to post training reduced&lt;br&gt;Control group: no improvement in any measure&lt;br&gt;6 months post-training (n=62): maintained effects:&lt;br&gt;- Speeded neural timing (noise condition only)&lt;br&gt;- Reduction of neural variability (noise condition)&lt;br&gt;- Improved auditory processing speed&lt;br&gt;NOT maintained:&lt;br&gt;- Smaller noise-induced timing shifts pre to post training&lt;br&gt;- Improved auditory memory&lt;br&gt;- Improved speech in noise perception &lt;br&gt;NA</td>
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<td><strong>3. Anderson et al., 2013 (in Frontiers in System Neuroscience)</strong>&lt;br&gt;Training groups: 1. HL_AT n=14 2. NH_AT n=15</td>
<td>NH &lt;=25dB HL&lt;br&gt;HL &lt;=80 dB HL&lt;br&gt;n= 58 38 females 55-79 years</td>
<td>Auditory-cognitive training (BrainFitness) Vowel transitions in linguistic contexts, including syllables, words, sentences, and</td>
<td>1h / session 5 days/week for 8 weeks (40 sessions)</td>
<td>HL_AT group improvement:&lt;br&gt;- QuickSIN&lt;br&gt;- Attention tasks&lt;br&gt;- Showed reduction in envelope decoding</td>
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<tr>
<td>Study</td>
<td>Description</td>
<td>Participants</td>
<td>Intervention/Control</td>
<td>Outcome(s)</td>
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<tr>
<td><strong>Effect of auditory cognitive training (BrainFitness) on changes in auditory processing and its relationship to speech processing and perception.</strong></td>
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</table>
| 4. Barcroft et al., 2016     | Generalization of auditory training (cLEAR). 69 participants were analyzed in Barcroft et al. 2011. | Experienced HA users PTA = 42-51 dB HL | 1. Single-talker (ST) group (n=42) 2. Multi-talker (MT) group (n=41) 3. Control group (n=24) randomized | HI n=28 μ=66 years  
Auditory cognitive training (clear): listening comprehension activities in background noise (speech).  
Control: watching of DVDs and answering questions |
|                              | Control: watching of DVDs and answering questions                           | n=107        |                      | NH_AT group improvement:  
- Auditory short-term memory  
Control groups: no changes |
|                              |                                                                             | 50 females μ=66 years | 1h / session 2 days/week for 6 weeks (12 sessions) |                                                                           |
|                              |                                                                             | n=44         |                      |                                                                           |
|                              |                                                                             | 15 females μ=65.3 years |                                                                           |                                                                           |
|                              |                                                                             |               |                      |                                                                           |
| 5. Ferguson et al., 2014     | Efficacy of auditory training for hearing and cognitive abilities in a group with mild sensorineural hearing loss. | Experienced HA users PTA = 21-40 dB HL | 1. AT group: n=23 2. Control group: n=21 randomized (minimization) | ST group: no improvement  
MT group: no improvement  
NT group: no improvement |
|                              |                                                                             | n=55         |                      |                                                                           |
|                              |                                                                             | 26 females μ=71 years | 15min/session 6 days/week for 4 weeks (24 sessions) |                                                                           |
|                              |                                                                             |               |                      |                                                                           |
| 6. Humes et al., 2014        | The effect of training dosage on the benefit of auditory training in hearing-impaired adults. | Mild to moderately severe HL with and without HA use | 1. AT group: n= 35 2. Control group: n=20 randomized | AT group:  
- Speech perception: no improvement  
- Working memory: no improvement  
- Divided attention: improvement  
- GHABP: improvement in Disability scales  
- SSQ: no improvement  
Control group: no improvement in any task  
- Untrained speech tests (VAST and CID):  
AT group: no improvement  
Control group no improvement |
<p>|                              |                                                                             | n=55         |                      |                                                                           |
|                              |                                                                             | 26 females μ=71 years | 75-90 min/session 2 days /week for 7.5 weeks or 75-90 min/session 3x/week |                                                                           |
|                              |                                                                             |               |                      |                                                                           |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Intervention</th>
<th>Follow-up</th>
<th>Outcome Measures</th>
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<tbody>
<tr>
<td>7. Karawani et al., 2015</td>
<td>NH &lt;= 25 dB HL (&lt;= 6 kHz) and &lt;= 30 dB HL (6-8 kHz) HL: PTA &lt;= 60 dB HL (no use of HA)</td>
<td>NH AT group: n=21, HL AT group: n=25, HL control group n=10 randomized</td>
<td>20-30min/session for 5 weeks (15 sessions)</td>
<td>Auditory-cognitive training (LACE): comprehension of degraded speech cognitive skills, communication strategies</td>
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<td>NH: n=21 μ= 64.6 years HL: n=35 μ= 67.6 years</td>
<td>Control group: delayed training</td>
<td>60-90min/session for 8.5 weeks (μ=20 sessions)</td>
<td>- Pseudo word discrimination task: improvement</td>
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<td>60-71 years 35 females</td>
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<td>- sentences task: improvement</td>
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<td>- Duration discrimination task: no improvement</td>
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<td>- Frequency discrimination task: no improvement</td>
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<td>8. Kuchinsky et al., 2014</td>
<td>Mild to moderate, high frequency HL</td>
<td>1. AT group n=14, Control group n=15 no randomization reported</td>
<td>60-90min/session for 8.5 weeks (μ=20 sessions)</td>
<td>No improvement for control and NH group.</td>
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<td>n=29 μ=70.2 years 12 females</td>
<td>Control group: no training</td>
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<td>AT group:</td>
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<td>- Word identification: significant improvement for untrained SNRs and talkers</td>
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<td>- Reaction times in word identification faster (compared to baseline and control group)</td>
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<td>- Pupillometry: faster peaking and larger pupil response</td>
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<td>9. Lavie et al., 2013</td>
<td>New HA users</td>
<td>Novel HA users n= 36 ages 64–88 16 females</td>
<td>45min/session 7 sessions (over one month)</td>
<td>Dichotic listening test significant performance increase in both groups; trend of higher performance increase in AT group compared with control group after 2 months training effect was significant, after 3.5 months trend of maintained training effect</td>
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<tr>
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<td>1. AT group n=27</td>
<td>Auditory Training: Speech material Free conversations</td>
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<td>Control group</td>
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<td>2. Control group n=9 randomized</td>
<td>Control group HA fitting without training</td>
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<td>- Word identification: no improvement</td>
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<td>- Reaction times in word identification faster (compared to baseline)</td>
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<td></td>
<td></td>
<td>- Pupillometry no change</td>
</tr>
<tr>
<td>Study</td>
<td>Intervention</td>
<td>Population</td>
<td>Control Group</td>
<td>AT Group</td>
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<td>10. Lessa et al., 2013</td>
<td>Effects of auditory rehabilitation including counseling and auditory training within the process of hearing aid fitting.</td>
<td>Novel HA users Mild to moderately severe HL Speech Recognition Percentage Index &gt;0 72%</td>
<td>1. Control group n= 8 2. AT group n= 9 no randomization</td>
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<tr>
<td>11. Morais et al., 2015</td>
<td>Effect of short-term auditory training in elderly. Benefit tested with behavioral measures and EEG (P300).</td>
<td>HL &lt;= 40 dB HL (0.5,1,2 kHz) wave V present in ABR</td>
<td>1. Passive control group (PCG) n=8 2. Active control group (ACG) n=8 3. AT group n=16 randomized</td>
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<td>12. Olson et al., 2013</td>
<td>Effect of DVD-based LACE training with novel and experienced HA users.</td>
<td>Mild to moderate HL Experienced and novel HA users</td>
<td>1. Experienced HA users AT group (eHAt) n=14 2. Novel HA users AT group (nHAt) n=8</td>
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</tbody>
</table>
3. Novel HA users control group (nHAc)
   n=7
   partly randomized
   (new HA users)

Novel HA users
HL <40dB HL for
frequencies <1.5 kHz
and <70 dB HL for
frequencies 2-8 kHz

- AT group (n=11)
- Active control group
  (n=11)
  partly randomized

Auditory training:
(ReadMyQuips) with
audio visual material
Audio-visual cross-word
puzzles

control group:
audiobook and questions

Control group: no improvement in any
measure

13. Rao et al., 2017
Investigation of the
effect of hearing aid
use and the
effectiveness of
auditory training
(ReadMyQuips). Each
participant had an
acclimatization of 4
weeks after first fitting

1. AT group
2. Active control group
   (n=11)
   partly randomized

Novel HA users
n=22
49-85 years
12 males

Auditory training:
(ReadMyQuips) with
audio visual material
Audio-visual cross-word
puzzles

Control group:
audiobook and questions

AT group:
- HINT: improvement
- Auditory selective attention:
  improvement
- Event-related potentials (ERP) P3a,
P3b: no change
- Correlation: greater mean ERP
  amplitudes were associated with higher
  change in d’

2. Control group:
   no effects
   (improvement) visible
   No effects during 4 weeks
   acclimatization period
   - Multimodal Lexical Sentence Test for
     Adults (AV and AO speech in noise)
     no significant difference between the
     groups (AO and AV condition)

14. Rishiq et al., 2016
Benefit of hearing aid
fitting in combination
with audio-visual
training (ReadMyQuips)
compared with hearing
aid fitting alone.

Novel and experienced
HA users
PTA (500,1000, 2000Hz) <= 50dB HL

- AT group n=12
- Control group n=12
  randomized

Novel HA users
n=24
51-84 years
6 females

Auditory training:
(ReadMyQuips) with
audiovisual material
Audio-visual cross-word
puzzles

Control group: fitting
without additional
training.

At 4 weeks
Multimodal Lexical Sentence Test for
Adults (AV and AO speech in noise)
no significant difference between the
groups (AO and AV condition)

15. Saunders et al.,
2016
Effect of auditory
training (Listening and
Communication
Enhancement (LACE))
in addition to

- Lace-DVD
- LACEC (computer-)

Novel HA users
n=136
(at least 4
weeks, less
than 6

Auditory-cognitive
training (LACE):
comprehension of
degraded speech
cognitive skills, communication
strategies

Lace-DVD:
30min/session
over 2 weeks
(10 sessions )
LACEC:
30min/sessions
over 4 weeks
(20 sessions)

No improvement in off-task transfer
measures found for any of the groups
(speech perception; auditory memory;
Use of linguistic context; perceived
benefit)

6-8 months post training
no significant effects
<table>
<thead>
<tr>
<th>Study</th>
<th>Description</th>
<th>Novel HA users</th>
<th>Placebo group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. Yu et al. 2017</td>
<td>Comparison of a mobile auditory training program in elderly hearing-impaired individuals.</td>
<td>n=20</td>
<td>Placebo: audiobooks + questions; Control: 1x30min information session about hearing and hearing aids.</td>
<td>30min/session 20 sessions</td>
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<td>µ= 59 dB HL</td>
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<td>1. Mobile AT (MAT) group (n=10)</td>
<td>1. Mobile AT (MAT) group (n=10)</td>
<td>1. Mobile AT (MAT) group (n=10)</td>
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<td>2. traditional AT (TAT) group (n=10)</td>
<td>2. traditional AT (TAT) group (n=10)</td>
<td>2. traditional AT (TAT) group (n=10)</td>
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<tr>
<td></td>
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<td>n=143 Experienced HA users</td>
<td>n=20 Novel HA users</td>
<td>n=143 Experienced HA users</td>
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<td>µ=75.6 years 12 males</td>
<td>TAT (control) group: training included in the fitting process</td>
<td>TAT group: no significant (but slight) improvement</td>
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<td>Auditory Training: Consonant, vowels and sentences in noise</td>
<td>MAT group: 40min/session 6days/week for 4 weeks (24 sessions)</td>
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<td>TT group: 1 day/week for 4 weeks</td>
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<td>TAT group: no significant (but slight) improvement</td>
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<td>MAT group: 40min/session 6days/week for 4 weeks (24 sessions)</td>
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<td>TT group: 1 day/week for 4 weeks</td>
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Abbreviations: AT: auditory training; CID: Central Institute for the Deaf (CID) Everyday Sentences test; GHABP: questionnaire Glasgow hearing aid benefit protocol; HA: hearing aid; HINT: hearing in noise test; HL: hearing loss; NA: not assessed; NH: normal hearing; PTA: pure tone average; QuickSIN: speech in noise test; SSQ: Speech, Spatial and Quality of hearing scales; VAST: veterans administration sentence test; WIN: words in noise test;