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

Study	Participants		Training		Outcome	Follow-up
	Hearing/ Groups	**N, age, sex**	**Stimuli**	**Frequency**		
1. Abrams et al., 2015 Effect of remotely delivered AT program for new hearing aid users.	Novel HA users AT group n=15 control group n=14 randomization	n= 29	Auditory training (ReadMyQuips) with audio-visual cross-word puzzles Control group was fitted with HA without training	30min/session 5 days/week for 3 weeks (15 sessions)	- HINT: no group difference - Words in noise test: no group difference - Intensity of AT was positively correlated with increase in speech perception (WIN)	NA
2. Anderson et al., 2013 (in PNAS) Effects of auditory-based cognitive training (BrainFitness) on neural timing and speech perception in elderly subjects.	NH + HL: PTA ≤45 dB HL 1. AT group (n=35) 2. Control group (n=32) pseudo-randomized	n= 67 38 females 55 - 70 years	Auditory-cognitive training (BrainFitness): Vowel transitions in linguistic contexts (syllables, words, sentences, stories.) Control: watched a series of educational movies and answered related questions afterwards	1h/session 5 days/week for 8 weeks (40 sessions)	AT group improvement: - QuickSIN - Auditory short- term memory - Processing speed - Neural timing (noise condition) - Neural variability reduced (noise condition) - Noise-induced timing shifts pre to post training reduced Control group: no improvement in any measure	6 months post-training (n=62): maintained effects: - Speeded neural timing (noise condition only) - Reduction of neural variability (noise condition) - Improved auditory processing speed NOT maintained: - Smaller noise-induced timing shifts pre to post training - Improved auditory memory - Improved speech in noise perception
3. Anderson et al., 2013 (in Frontiers in System Neuroscience)	NH <=25dB HL HL <=80 dB HL Training groups: 1. HL_AT n=14 2. NH_AT n=15	n= 58 38 females 55-79 years NH n=30 μ= 62 years	Auditory-cognitive training (BrainFitness) Vowel transitions in linguistic contexts, including syllables, words, sentences, and	1h / session 5 days/week for 8 weeks (40 sessions)	HL_AT group improvement: - QuickSIN - Attention tasks - Showed reduction in envelope decoding	NA

Effect of auditory cognitive training (BrainFitness) on changes in auditory processing and its relationship to speech processing and perception.	Control groups: 3. NH_CT n=15 4. HL_CT n=14 randomized	HI n=28 µ=66 years	stories. <u>Control</u>: watching of DVDs and answering questions		NH_AT group improvement: - Auditory short-term memory Control groups: no changes	
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) alternating assignment 3. Control group (n=24) blocked assignment	n=107 50 females µ=66 years	Auditory cognitive training (clear): listening comprehension activities in background noise (speech). <u>Control</u>: sign language lessons.	1h / session 2 days/week for 6 weeks (12 sessions)	- Iowa sentence test: ST group: no improvement MT group: no improvement NT group: no improvement	NA
5. Ferguson et al., 2014 Efficacy of auditory training for hearing and cognitive abilities in a group with mild sensorineural hearing loss.	HL: PTA= 21-40 dB HL 1. AT group: n=23 2. Control group: n=21 randomized (minimization)	n=44 15 females µ=65.3 years	Auditory Training: "Phonomena" phoneme training package (in quiet). <u>Control group:</u> delayed training	15min/session 6 days/week for 4 weeks (24 sessions)	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	4 weeks post-training all training effects were maintained
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	n=55 26 females µ=71 years No HA: n= 44 HA users: n=11	Auditory training: Speech material (words, sentences) <u>Control</u> group: no training	75-90 min/ session 2days /week for 7.5 weeks <u>or</u> 75-90 min/ session 3x/week	- Untrained speech tests (VAST and CID): AT group: no improvement control group no improvement	NA

				for 5 weeks (15 sessions)		
7. Karawani et al., 2015 Difference in auditory training benefit between individuals with normal hearing and age-related hearing loss.	NH <= 25 dB HL (<= 6 kHz) and <= 30 dB HL (6-8 kHz) HL: PTA <= 60 dB HL (no use of HA) 1. NH AT group: n=21 2. HL AT group: n=25 3. HL control group n=10 randomized	n= 56 60-71 years 35 females NH n=21 µ= 64.6 years HL: n=35 µ= 67.6 years	Auditory-cognitive training (LACE): comprehension of degraded speech cognitive skills, communication strategies Control group: delayed training	20-30min/ session for 4 weeks (13 sessions)	HL AT group: - Pseudo word discrimination task: improvement - sentences task: improvement - Duration discrimination task: no improvement - Frequency discrimination task: no improvement No improvement for control and NH group.	NA
8. Kuchinsky et al., 2014 Effect of auditory training in elderly hearing-impaired individuals on pupillometry and word recognition.	HL: Mild to moderate, high frequency HL 1. AT group n=14 2. Control group n=15 no randomization reported	n=29 µ=70.2 years 12 females	Auditory training. Closed-set word and phrase identification training in background speech-shaped noise (Burk (2006) and Humes (2009)) Control group: no training	60-90min/ session for 8.5 weeks (µ=20 sessions)	AT group: - Word identification: significant improvement for untrained SNRs and talkers - Reaction times in word identification faster (compared to baseline and control group) - Pupillometry: faster peaking and larger pupil response Control group - Word identification: no improvement - Reaction times in word identification faster (compared to baseline) - Pupillometry no change	NA
9. Lavie et al., 2013 Effect of auditory training on outcome of hearing aid fitting	New HA users 1. AT group n=27 2. Control group n=9 randomized	Novel HA users n= 36 ages 64–88 16 females	Auditory Training: Speech material Free conversations Control group HA fitting without training	45min/session 7 sessions (over one month)	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

10. Lessa et al., 2013 Effects of auditory rehabilitation including counseling and auditory training within the process of hearing aid fitting.	Novel HA users Mild to moderately severe HL Speech Recognition Percentage Index >0 72% 1. Control group n= 8 2. AT group n= 9 no randomization	n=17 6 females 60-84 years	Music auditory training: instrumental sounds (temporal resolution and order, selective attention, attention and working memory) Control: HA fitting without training	75 min/session 1x/week for 7 weeks (7 sessions)	- Staggered Spondaic Word Test: significant difference for AT group; no difference for control group	NA
11. Morais et al., 2015 Effect of short-term auditory training in elderly. Benefit tested with behavioral measures and EEG (P300).	HL <= 40 dB HL (0.5,1,2 kHz) wave V present in ABR 1. Passive control group (PCG) n=8 2. Active control group (ACG) n=8 3. AT group n=16 randomized	n=16 60-78 years 14 females	Auditory cognitive training (ACAT): Acoustically controlled stimuli with verbal and non-verbal stimuli with cognitive training. Words, sentences, tones (gap detection) All n=16 participants received training after initial placebo training (control group)	ACG: 45min/ week for 8 weeks ATG: 50min/ week for 8 weeks plus 3x15min/ week (8 sessions)	PCG: no training or re-test effect ACG: no training or re-test effect AT group: - Speech in noise: improvement (both ears) - Dichotic digit test: improvement (left ear) - Pitch-pattern sequence: improvement - Gap-in-noise test: improvement - Working memory trained but no benefits reported - P300 brain response: no difference (only for single cases)	NA
12. Olson et al., 2013 Effect of DVD-based LACE training with novel and experienced HA users.	Mild to moderate HL Experienced and novel HA users 1. Experienced HA users AT group (eHAt) n=14 2. Novel HA users AT group (nHAt) n=8	HA users (experienced and novel) n=29 52-81 years 13 females	Auditory-cognitive training (LACE): Comprehension of degraded speech cognitive skills, communication strategies Control: delayed training	30min/session 5days/week for 4 weeks (20 sessions)	eHAt and nHAt: - Speech in noise: improvement - Rapid speech: no improvement - Competing sentences tasks: improvement - Self-perceived benefit: (slight) improvement -greatest improvement for new HA users	NA

	3. Novel HA users control group (nHAc) n=7 partly randomized (new HA users)				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	Novel HA users HL <40dB HL for frequencies <1.5 kHz and <70 dB HL for frequencies 2-8 kHz 1. AT group (n=11) 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	30min/session 5days/week for 4 weeks (20 sessions)	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	NA
14. Rishiq et al., 2016 Benefit of hearing aid fitting in combination with audio-visual training (ReadMyQuips) compared with hearing aid fitting alone.	Novel HA users 1. AT group n=12 2. Control group n=12 randomized	n=24 51-84 years 6 females	Auditory training: (ReadMyQuips) with audiovisual material Audio-visual cross-word puzzles Control group: fitting without additional training.	30min/session 5days/week for 4 weeks (20 sessions)	- Multimodal Lexical Sentence Test for Adults (AV and AO speech in noise) no significant difference between the groups (AO and AV condition)	No long-term effects reported after 4 weeks
15. Saunders et al., 2016 Effect of auditory training (Listening and Communication Enhancement (LACE)) in addition to	Novel and experienced HA users PTA (500,1000, 2000Hz) <= 50dB HL 1. LACE-DVD 3. LACEC (computer-	n=279 only males 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

standard-of-care hearing aid intervention.	based) 3. Placebo group 4. Control group randomized (blocks)	months) Experienced HA users n=143	Placebo: audiobooks + questions) Control: 1x30min information session about hearing and hearing aids	Placebo: 30min/session 20 sessions		
16. Yu et al. 2017 Comparison of a mobile auditory training program in elderly hearing-impaired individuals.	Novel HA users HL μ= 59 dB HL 1. Mobile AT (MAT) group (n=10) 2. traditional AT (TAT) group (n=10) randomized	Novel HA users n=20 μ=75.6 years 12 males	Auditory Training: Consonant, vowels and sentences in noise TAT (control) group: training included in the fitting process	MAT group: 40min/session 6days/week for 4 weeks (24 sessions) TT group: 1 day/week for 4 weeks	MAT group - Vowel discrimination: no improvement - Sentence discrimination improvement TAT group: no significant (but slight) improvement	2 weeks post-training MAT group: consonant and sentence recognition improvement remained

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;