

Table 1. Summary characteristics of studies on cigarette smoking and tinnitus included in the meta-analysis (1/6)

<i>Author</i>	<i>Study design</i>	<i>Sample</i>	<i>Definition of tinnitus</i>	<i>Classification of smoking status</i>	<i>Results OR ( 95 % CI)</i>	<i>Adjustments for</i>
<b>Brunnberg et al. (2008)</b> Tinnitus and hearing loss in 15-16-year-old students: mental health symptoms, substance use, and exposure in school	Cross-sectional	n = 2 878 1 443 men 1 435 women 15 - 16 years	„Have you experienced tinnitus during the last three months?’ Responses were ‘always’, ‘often’, ‘sometimes’, ‘seldom’, or ‘never’. Those who reported tinnitus often or always were compared with the participants who reported sometimes, seldom, or never.”	Daily smoking	2.32 (1.57 – 3.44)*	-
<b>Canlon et al. (2013)</b> Associations between stress and hearing problems in humans	Cross-sectional	n = 348 268 women 140 men < 45 years: 103 50 years: 153 > 60 years: 91	„Have you recently experienced a sound in one or both ears that was not from an external source (called tinnitus) which lasted for more than five minutes?’ Severity of tinnitus was the mean total score on the Tinnitus Handicap Questionnaire (THQ) comprising 26 questions.”	Smoking (Yes /No)	Any tinnitus: 0.78 (0.35 – 1.74)*  Severe tinnitus: 1.81 (0.57 – 5.75)*	-
<b>Davis et al. (1991)</b> Factors influencing tinnitus report in Great Britain	Cross-sectional	n = 2 679 17 - 80 years	„About 10 % of the GB adult population report tinnitus that lasts for at least five minutes and is present not only after loud sounds - we have called this prolonged spontaneous tinnitus (PST).”	Tobacco smoking	1.72 (1.35 – 2.18)*	Hearing impairment
<b>Fujii, K. et al. (2011)</b> Prevalence of tinnitus in community-dwelling Japanese adults	Cross-sectional	n = 14 423 7 973 women 6 450 men 45 - 79 years	„Have you ever had tinnitus lasting longer than 5 minutes? Do not include when this happened immediately after very loud sounds.” [...] „I have never had tinnitus,” “I have tinnitus,” or “I have had tinnitus.”	Current smoking:  Former smoking:  Never smoking:	1.09 (0.91 – 1.31) <sup>†</sup>  0.94 (0.80 – 1.09) <sup>†</sup>  Reference	Age, gender
<b>Gallus et al. (2015)</b> Prevalence and Determinants of Tinnitus in the Italian Adult Population	Cross-sectional	1 724 932 women 792 men > 45 years	„in the past 12 months, have you been bothered by ringing or buzzing in your ears or head that lasted for 5 min or more?’ [...]’How long have you been bothered by this [...]’How much of a problem is this [...]?’”	Current smoking: Any tinnitus: Chronic tinnitus: Severe tinnitus:	0.64 (0.34-1.20) 0.59 (0.29-1.19) 0.94 (0.29-3.09)	Sex, age, level of education, geographic area, alcohol consumption and BMI.

\* Crude OR, that is not provided in the article and calculated with data from distribution tables.

† Effect sizes for subgroups are provided in the article. The effect size given here is a summary variable.

Table 1. Summary characteristics of studies on cigarette smoking and tinnitus included in the meta-analysis (2/6)

<i>Author</i>	<i>Study design</i>	<i>Sample</i>	<i>Definition of tinnitus</i>	<i>Classification of smoking status</i>	<i>Results OR ( 95 % CI)</i>	<i>Adjustments for</i>
<b>Gallus et al. (2015)</b> (continuation)				Former smoking: Any tinnitus: Chronic tinnitus: Severe tinnitus:  Never smoking:	 1.50 (0.96-2.34) 1.53 (0.96-2.46) 1.51(0.61-3.76)  Reference	
<b>Hoffman &amp; Reed (2004)</b> <sup>47</sup>  Epidemiology of Tinnitus	Cross-sectional	n = 47 317 24 850 women 22 467 men 20 - 101 years Ø 50.2 years	„Are you bothered by ringing in your ears?“	Ever smoked daily:  Never smoked daily:	1.22 (1.16 – 1.29) <sup>†</sup>  Reference	hospitalization for head injury, lifestyle factors, occupational noise exposure
<b>Kim et al. ( 2015)</b>  Analysis of the Prevalence and Associated Risk Factors of Tinnitus in Adults	Cross-sectional	KNHANES IV and V 2009 – 2012 19 290 11 046 women 8 244 men 20 – 98 years Ø 45. 49 years	““The participants were asked if they had heard any ringing, buzzing, roaring, or hissing sounds without an external acoustic source in the past year. The response options were “Yes”, “No”, and “I cannot remember”. “Do these sounds bother you?” (“No”/“A little annoying”/“Very annoying”)”	Smoking, every day: Smoking, but not every day:  Quit > 1 year  no smoking:	 1.18 (1.04 – 1.34) <sup>†</sup>  1.25 (1.06 – 1.47)  Reference	Age, sex, number of people in household, thyroid disease, occupation, asthma, depression, stress, hyperlipidemia, sleep hours, hearing loss, osteoarthritis, rheumatoid arthritis, tympanic membrane,
<b>Kirk, K. M., et al. (2011)</b>  Self-reported tinnitus and ototoxic exposures among deployed Australian Defence Force personnel.	Cohort study	Bougainville Health Study: n = 2 342 2 031 men 311 women Control group: 860 East Timor Health Study: n = 1 833 1 624 men 209 women Control group: 951	„Respondents were asked whether they had suffered in the last month from “ringing in the ears” and the severity of the symptoms (mild/moderate/severe), if any.”	Smoking during deployment (Yes/No)	Bougainville Health Study: 1.26 (0.95 – 1.66)  East Timor Health Study: 0.97 (0.73 – 1.3)	Sex, age, service rank and service type

<sup>†</sup> Effect sizes for subgroups are provided in the article. The effect size given here is a summary variable.

Table 1. Summary characteristics of studies on cigarette smoking and tinnitus included in the meta-analysis (3/6)

<i>Author</i>	<i>Study design</i>	<i>Sample</i>	<i>Definition of tinnitus</i>	<i>Classification of smoking status</i>	<i>Results OR ( 95 % CI)</i>	<i>Adjustments for</i>
<b>Lasisi et al. (2010)</b> Tinnitus in the elderly: Profile, correlates, and impact in the Nigerian Study of Ageing	Cohort study	n= 1 302 750 women 552 men > 65 years Ø: 77.3 years	„tinnitus was assessed by asking respondents whether they had a perception of ringing, swishing, humming, or other type of noise in the ear or head without an external source of sound.”	Cigarette smoking, ever (Yes/No):	1.27 (0.93 – 1.74)*	-
<b>Lindgren et al. (2009)</b> Tinnitus among airline pilots: prevalence and effects of age, flight experience, and other noise	Cross-sectional	n = 460 418 men 42 women 32 - 63 years	„For the question on whether tinnitus was experienced for more than 5 min during the previous year (yes, no), we defined yes = 1 as cases of tinnitus. The question on frequency of tinnitus (never, seldom, often, constant) was dichotomized, defining often or constant tinnitus = 1, and those with never or seldom tinnitus as non-cases = 0.”	Current smoking (Yes/No):	Occasional tinnitus: 1.17 (0.33 – 4.18)  Frequent tinnitus: 2.92 (0.35 – 24.50)	Age, gender, experience as a military pilot, impulse noise, type of aircraft, years of employment, hearing impairment.
<b>Mahboubi et al. (2013)</b> The prevalence and characteristics of tinnitus in the youth population of the United States	Cross-sectional	n = 3 520 2 003 women 1 517 men 12 - 19 years	„The presence of tinnitus was defined as responding “yes” to the question: “In the past 12 months, have you been bothered by ringing, roaring, or buzzing in your ears or head that lasts for 5 minutes or more?” This question was followed by “How long have you been bothered by this ringing, roaring, or buzzing in your ears or head?” Chronic tinnitus was defined as tinnitus duration of 3 months or more.”	Ever tried cigarette smoking:(Yes/No)	Overall tinnitus: 1.21 (0.74 – 1.98)  Chronic tinnitus: 0.96 (0.47 – 1.97)	Age, sex, ethnicity, income passive smoking, ear infections, tympanostomy tube, recreational noise exposure, BMI, Hypertension, anemia, abnormal otoscopy, Tampanometry (other types than type A), low frequency hearing loss, high frequency hearing loss

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Table 1. Summary characteristics of studies on cigarette smoking and tinnitus included in the meta-analysis (4/6)

<i>Author</i>	<i>Study design</i>	<i>Sample</i>	<i>Definition of tinnitus</i>	<i>Classification of smoking status</i>	<i>Results OR ( 95 % CI)</i>	<i>Adjustments for</i>
<b>Marmut et al. ( 2014)</b> Tinnitus among Serbian secondary school students in relation to their behavior and habits	Cross-sectional	n = 771 494 women 277 men 14 – 20 years Ø: 17.6 years	“Do you feel occasional or permanent buzzing or ringing in your ears?”	Smoker:  Former and never smokers:	1.97 (0.31–12.64) <sup>†</sup>  Reference	Alcohol consumption, coffee consumption, drug addiction, smoking, passive smoking, night outs, use of personal music players
<b>McCormack et al. (2014)</b> Association of Dietary Factors with Presence and Severity of Tinnitus in a Middle-Aged UK Population	Cross-sectional	171 722 40 – 69 years	“Do you get or have you had noises (such as ringing or buzzing) in your head or in one or both ears that lasts for more than five minutes at a time?’ [...] ‘Yes, now most or all of the time’ or ‘Yes, now a lot of the time’ [...] ‘Yes, now some of the time’. [...] ‘How much do these noises worry, annoy or upset you when they are at their worst?’[...] ‘severely’ or ‘moderately’. The other options were ‘slightly’ and ‘not at all’”	Current smoking:  Former smoking:  Never smoking:	Transient tinnitus: 1.0 (0.94-1.06) <sup>‡</sup> Persistent tinnitus: 0.89 (0.83-0.95) <sup>‡</sup> Bothersome tinnitus: 1.16 (1.03-1.33) <sup>‡</sup>  Reference	age, sex, Townsend deprivation, noise exposure, hearing difficulty, smoking status, BMI, body fat percentage, diabetes, cardiovascular disease, hypertension and high cholesterol, and neuroticism symptoms
<b>Michikawa et al. (2010)</b> Prevalence and factors associated with tinnitus: a community-based study of Japanese elders.	Cross-sectional	n = 1 320 736 women 584 men > 65 years	„In the past year have you experienced any ringing, buzzing, or other sounds (tinnitus) in your ears?”	Current smoking:  Former smoking:  Never smoking:	0.96 (0.63 – 1.45)*  1.14 (0.71 – 1.82)*  Reference	-
<b>Nondahl et al. (2002)</b> Prevalence and 5-year incidence of tinnitus among older adults: the epidemiology of hearing loss study	Cohort study  Cross-sectional analysis	n = 3737 2 156 women 1 581 men 48 – 92 years Ø: 65.8 years	„In the past year, have you had buzzing, ringing or noise in your ears? [...] How severe is this noise in its worst form?” [...]; and (3)“Does this noise cause you to have problems getting to sleep?” A person was classified as having significant tinnitus if he/she reported having “buzzing, ringing, or noise” in the ears in the past year of at least moderate severity, tinnitus that caused difficulty in falling asleep, or both.”	Current smoking:  Ex smokers Never smokers	Cross-sectional analysis: 1.20 (0.88 – 1.64)*  5-year incidence: 1.05 (0.65 – 1.71)*  Reference	-

<sup>‡</sup> This OR were not shown in the article and calculated as the inverse OR of never smoking with current smoking as a reference category.

\* Crude OR, that is not provided in the article and calculated with data from distribution tables

<sup>†</sup> Effect sizes for subgroups are provided in the article. The effect size given here is a summary variable.

Table 1. Summary characteristics of studies on cigarette smoking and tinnitus included in the meta-analysis (5/6)

Author	Study design	Sample	Definition of tinnitus	Classification of smoking status	Results OR (95% CI)	Adjustments for
<b>Nondahl et al. (2010)</b> The ten-year incidence of tinnitus among older adults	Cohort study	n = 2 922 1 444 men 985 women 48 – 92 years Ø: 65.8 years	See: Nondahl et al. (2002)	Current smoking:	1.34 (0.93- 1.92) (Hazard Ratio = HR)	Age, sex, arthritis ethanol consumption, head injury, obesity, hearing loss
				Ever smoking:	1.4 (1.1 – 1.79) (HR)	
				Former smoking:	1.42 (1.17– 1.73) (HR)	
<b>Nondahl et al. (2011)</b> Tinnitus and its risk factors in the Beaver Dam Offspring Study	Cross-sectional	n = 3 267 21 - 84 years	See: Nondahl et al. (2002)	Current smoking:	1.5 (1.12- 2.01)	Age, sex
				Ever smoking:	1.24 (0.99 – 1.56)	
				Former smoking:	1.10 (0.88 – 1.38) <sup>†</sup>	
				Never smoking:	Reference	
<b>Palmer et al. (2002)</b> Occupational exposure to noise and the attributable burden of hearing difficulties in Great Britain	Cross-sectional	n = 12 907 16 - 61 years	„During the past 12 months have you had noises in your head or ears (such as ringing, buzzing, or whistling) which lasted longer than five minutes?“. Tinnitus which was reported to occur most or all of the time was defined as “persistent tinnitus”	Ever smoking:	1.0 (0.84 – 1.19) <sup>†</sup> (PR)	Age, sex, frequent headaches, frequent tiredness, years worked in a noisy job
				Never smoking:	Reference	
<b>Palmer et al. (2004)</b> Cigarette smoking, occupational exposure to noise, and self-reported hearing difficulties.	Cross-sectional	n = 12 907 16 - 61 years	See: Palmer et al. (2002)	Current smoking:	1.33 (1.05 – 1.68) <sup>†</sup>	Noise-exposure, age, sex, self-report of frequent tiredness or stress and frequent headaches, years worked in a noisy job
				Former smoking:	1.14 (0.9 – 1.44) <sup>†</sup>	
				Never smoking:	Reference	

<sup>†</sup> Effect sizes for subgroups are provided in the article. The effect size given here is a summary variable.

Table 1. Summary characteristics of studies on cigarette smoking and tinnitus included in the meta-analysis (6/6)

<i>Author</i>	<i>Study design</i>	<i>Sample</i>	<i>Definition of tinnitus</i>	<i>Classification of smoking status</i>	<i>Results OR ( 95 % CI)</i>	<i>Adjustments for</i>
<b>Shargorodsky et al. (2010)</b> Prevalence and characteristics of tinnitus among US adults	Cross-sectional	n = 14 178 7 259 women 6 919 men 20 – 69 years	„Tinnitus was defined as answering “yes” to the question, “In the past 12 months, have you ever had ringing, roaring, or buzzing in your ears?” This was followed by the question “How often did this happen?” Frequent tinnitus was defined as answering “almost always” or “at least once a day” to this question“	Current smoking:  Former smoking:  Never smoking:	Any tinnitus: 1.34 (1.14 – 1.57) Frequent tinnitus: 1.21 ( 0.96 -1.52)  Any tinnitus: 1.14 (1.01- 1.28) Frequent tinnitus: 1.37 (1.12 – 1.67)  Reference	Sex, age, race/ethnicity, education level, body-mass index, hypertension, history of diabetes mellitus, taking a cholesterol-lowering medication, leisure-time noise exposure, leisure-time, fire-arm noise-exposure, occupational noise-exposure
<b>Sindhusake et al. (2003)</b> Risk factors for tinnitus in a population of older adults: the blue mountains hearing study	Cross-sectional	n = 2 015 1 156 women 859 men > 55 years Ø 69.8 years	„Have you experienced any prolonged ringing, buzzing or other sounds in your ears or head within the past year. . .that is, lasting for 5 minutes or longer?” which provided possible responses of yes, “no,” or “missing.””	Current smoking:  Former smoking:  Never smoking:	0.98 (0.74 – 1.3)  0.89 (0.75 – 1.07)  Reference	Age, gender
<b>Sindhusake et al. (2004)</b> Factors predicting severity of tinnitus: a population-based assessment	Cross-sectional	n = 2 015 1 156 women 859 men Ø 69.8 years	„Have you experienced any prolonged ringing, buzzing or other sounds in your ears or head within the past year. . .that is, lasting for 5 minutes or longer?” [...] Participants who responded affirmatively to this question were asked to rate their severity of tinnitus using the question “How annoying is your tinnitus?” This question produced possible responses of “extremely,” “very,” “mildly,” “not at all,” “unsure,” and “missing.”[...] As few subjects reported “extremely annoying tinnitus” [...] and “very annoying tinnitus” [...] these groups were combined and reclassified as “severe tinnitus.”	Current smoking:  Former smoking:  Never smoking:	1.13 (0.70 – 1.81)  0.83 (0.60 – 1.14)  Reference	Age, gender