	Reference	Population:	Exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
		general	exposure to high	no noise	adjusted for	assessment of	expressed as	Anything else to
		population in	levels of	exposure or	confounding	outcome	effect per dB if	note
		settings	environmental	lower levels			possible.	
		(hospitals,	noise from various	of noise				
		residences,	noise sources	exposure			Type of analyses	
		public venues,	+ noise metric					
		educational	involved +				Sample size	
		facilities) +	modelled or				relating to the	
		response rate	measured noise				effect size	
		and other						
		selection /bias						
		factors						
		Cross-sectional						
		or longitudinal						
AIRCRAFT	NOISE EXPOSURE							
Interventio	on Evidence							
1.	Hygge et al,	Population:	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
1.	Hygge et al, Psychol Sci,	Population: school children,	Noise exposure: aircraft noise	Comparison : children from	Confounding : None	Outcomes: Reading test in	Findings: At the new	Comments: Findings:
1.	Hygge et al, Psychol Sci, 2002	Population: school children, noisy and quiet	Noiseexposure:aircraftnoiselevelsmeasured	Comparison : children from noisy schools	Confounding : None	Outcomes: Reading test in German	Findings: At the new airport children	Comments: Findings: The effect of
1.	Hygge et al, Psychol Sci, 2002	Population: school children, noisy and quiet schools around	Noiseexposure:aircraftnoiselevelsmeasuredaroundschools	Comparison: children from noisy schools around the	Confounding : None	Outcomes: Reading test in German (Biglmaier,	Findings: At the new airport children showed a	Comments: Findings: The effect of noise on the
1.	Hygge et al, Psychol Sci, 2002	Population: school children, noisy and quiet schools around the old and the	Noiseexposure:aircraftnoiselevelsmeasuredaroundschoolsbeforeandafter	Comparison : children from noisy schools around the old and the	Confounding : None	Outcomes: Reading test in German (Biglmaier, 1969),	Findings: At the new airport children showed a decrease of the	Comments: Findings: The effect of noise on the reading tasks was
1.	Hygge et al, Psychol Sci, 2002	Population: school children, noisy and quiet schools around the old and the new airport,	Noise exposure: aircraft noise levels measured around schools before and after relocation of the	Comparison: children from noisy schools around the old and the new airport	Confounding : None	Outcomes: Reading test in German (BigImaier, 1969), Long-term	Findings: At the new airport children showed a decrease of the number of correct	Comments: Findings: The effect of noise on the reading tasks was not mediated by
1.	Hygge et al, Psychol Sci, 2002	Population: school children, noisy and quiet schools around the old and the new airport, total n=326,	Noise exposure: aircraft noise levels measured around schools before and after relocation of the airport;	Comparison: children from noisy schools around the old and the new airport compared to	Confounding : None	Outcomes: Reading test in German (Biglmaier, 1969), Long-term memory – recall of	Findings: At the new airport children showed a decrease of the number of correct answers on long-	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or
1.	Hygge et al, Psychol Sci, 2002	Population: school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs.	Noiseexposure:aircraftnoiselevelsmeasuredaroundschoolsbeforeandafterrelocationofairport;Noisesource:	Comparison: children from noisy schools around the old and the new airport compared to children from	Confounding : None	Outcomes: Reading test in German (Biglmaier, 1969), Long-term memory – recall of a text read in noisy	Findings: At the new airport children showed a decrease of the number of correct answers on long- term memory	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech
1.	Hygge et al, Psychol Sci, 2002	Population: school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups:	Noiseexposure:aircraftnoiselevelsmeasuredaroundschoolsbeforeandafterrelocationrelocationofairport;Noisesource:aircraft	Comparison: children from noisy schools around the old and the new airport compared to children from quiet schools	Confounding : None	Outcomes: Reading test in German (Biglmaier, 1969), Long-term memory – recall of a text read in noisy conditions the	Findings: At the new airport children showed a decrease of the number of correct answers on long- term memory task, and	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception.
1.	Hygge et al, Psychol Sci, 2002	Population: school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups: n=43 old-airport,	Noiseexposure:aircraftnoiselevelsmeasuredaroundschoolsbeforeandafterrelocationrelocationoftheairport;Noisesource:aircraftnoiseNoisemetrics:	Comparison: children from noisy schools around the old and the new airport compared to children from quiet schools around the	Confounding : None	Outcomes: Reading test in German (Biglmaier, 1969), Long-term memory – recall of a text read in noisy conditions the previous day,	Findings: At the new airport children showed a decrease of the number of correct answers on long- term memory task, and impairment of	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception. Poorer reading
1.	Hygge et al, Psychol Sci, 2002	Population: school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups: n=43 old-airport, no-noise; n=65	Noiseexposure:aircraftnoiselevelsmeasuredaroundschoolsbeforeandafterrelocationrelocationoftheairport;Noisesource:aircraftnoiseNoisemetrics:Leq, 24h(dBA)	Comparison: children from noisy schools around the old and the new airport compared to children from quiet schools around the old and the	Confounding : None	Outcomes: Reading test in German (Biglmaier, 1969), Long-term memory – recall of a text read in noisy conditions the previous day, Short-term	Findings: At the new airport children showed a decrease of the number of correct answers on long- term memory task, and impairment of speech	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception. Poorer reading was not
1.	Hygge et al, Psychol Sci, 2002	Population: school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups: n=43 old-airport, no-noise; n=65 old-airport plus	Noiseexposure:aircraftnoiselevelsmeasuredaroundschoolsbeforeandafterrelocationrelocationoftheairport;Noisesource:aircraftnoiseNoisemetrics:Leq, 24h(dBA)	Comparison: children from noisy schools around the old and the new airport compared to children from quiet schools around the old and the new airport	Confounding : None	Outcomes: Reading test in German (BigImaier, 1969), Long-term memory – recall of a text read in noisy conditions the previous day, Short-term memory –	Findings: At the new airport children showed a decrease of the number of correct answers on long- term memory task, and impairment of speech perception.	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception. Poorer reading was not mediated by
1.	Hygge et al, Psychol Sci, 2002	Population: school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups: n=43 old-airport, no-noise; n=65 old-airport plus noise; n=107	Noiseexposure:aircraftnoiselevelsmeasuredaroundschoolsbeforeandafterrelocationrelocationoftheairport;Noisesource:aircraft noiseNoiseNoisemetrics:Leq, 24h (dBA)	Comparison: children from noisy schools around the old and the new airport compared to children from quiet schools around the old and the new airport	Confounding : None	Outcomes: Reading test in German (Biglmaier, 1969), Long-term memory – recall of a text read in noisy conditions the previous day, Short-term memory – remembering	Findings: At the new airport children showed a decrease of the number of correct answers on long- term memory task, and impairment of speech perception. At the old airport	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception. Poorer reading was not mediated by speech
1.	Hygge et al, Psychol Sci, 2002	Population: school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups: n=43 old-airport, no-noise; n=65 old-airport plus noise; n=107 new-airport, no-	Noise exposure: aircraft noise levels measured around schools before and after relocation of the airport; Noise source: aircraft noise Noise metrics: Leq, 24h (dBA)	Comparison: children from noisy schools around the old and the new airport compared to children from quiet schools around the old and the new airport	Confounding : None	Outcomes: Reading test in German (Biglmaier, 1969), Long-term memory – recall of a text read in noisy conditions the previous day, Short-term memory – remembering consonants),	Findings: At the new airport children showed a decrease of the number of correct answers on long- term memory task, and impairment of speech perception. At the old airport children showed	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception. Poorer reading was not mediated by speech perception, and
1.	Hygge et al, Psychol Sci, 2002	Population: school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups: n=43 old-airport, no-noise; n=65 old-airport plus noise; n=107 new-airport, no- noise; n=111	Noise exposure: aircraft noise levels measured around schools before and after relocation of the airport; Noise source: aircraft noise Noise metrics: Leq, 24h (dBA)	Comparison: children from noisy schools around the old and the new airport compared to children from quiet schools around the old and the new airport	Confounding : None	Outcomes: Reading test in German (Biglmaier, 1969), Long-term memory – recall of a text read in noisy conditions the previous day, Short-term memory – remembering consonants), Attention – visual	Findings: At the new airport children showed a decrease of the number of correct answers on long- term memory task, and impairment of speech perception. At the old airport children showed decrease in the	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception. Poorer reading was not mediated by speech perception, and impaired recall
1.	Hygge et al, Psychol Sci, 2002	Population: school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups: n=43 old-airport, no-noise; n=65 old-airport plus noise; n=107 new-airport, no- noise; n=111 new-airport plus	Noise exposure: aircraft noise levels measured around schools before and after relocation of the airport; Noise source: aircraft noise Noise metrics: Leq, 24h (dBA)	Comparison: children from noisy schools around the old and the new airport compared to children from quiet schools around the old and the new airport	Confounding : None	Outcomes:Reading testReading testGerman(Biglmaier,1969),Long-termmemory – recall ofa text read in noisyconditionstheprevious day,Short-termmemorymemoryrememberingconsonants),Attention – visualsearchand	Findings: At the new airport children showed a decrease of the number of correct answers on long- term memory task, and impairment of speech perception. At the old airport children showed decrease in the number of errors	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception. Poorer reading was not mediated by speech perception, and impaired recall was in part

Table S1: Characteristics of included studies for environmental noise effects on reading and oral comprehension

		Inclusion				tested in both	increase of the	reading.
		criteria				quiet and noisy	number of correct	
		2 years of				conditions	answers on short-	
		residence				Speech perception	term memory	
		sneaking				- hearing a story	task and	
		Gormon fluontly				against noisy	improvement of	
		normal hoaring				background	spooch	
		formation incaring				ladantad from	speech	
		(assessed by				(adapted from		
		audiometric				Hygge, Ronnberg,	Type of analyses:	
		screening)				Larsby, Arlinger,	t-test for	
		Longitudinal				1992)	independent	
		study; baseline					samples,	
		(wave 1): 6					multivariate	
		months before					analyses of	
		the opening of					variance	
		new airport,					MANOVA	
		follow-up 1 and					Sample size	
		2 years (waves 2					relating to the	
		and 3) after					effect size:	
		changeover of					n=326	
		airports						
		Intervention						
		Study						
2.	Seabi et al, J	Population:	Noise exposure:	Compared to:	Confounding:	Outcome: Reading	Findings:	Comments:
	Exp Science	school children,	noise levels	low noise	Age, gender,	comprehension –	No difference in	Noise exposure:
	Eviron Epidem,	before and after	measured outside	group –	home language	tested using	reading	Noise levels
	2013	the relocation of	schools from 8 am	schools in	(English first	Suffolk Reading	conmprehention	measured in
		an international	to 10:30 am	quiet areas in	language, English	Scale Level 2	scores between	2010 and 2011 in
		airport, aged 9-	Noise groups: high	2009;	second language),	(SRS2) (Hagley,	low noise and	high noise and
		15yrs.	noise group –	remained	socio-economic	2002)	high noise groups	low noise groups
		Sampling	schools near flight	quiet in 2010	deprivation		after relocation of	were similar
		procedure: first	path in 2009, but	and 2011	(eligible for free		airport; the	(because of the
		testing in 2009:	after relocation of		meal at school)		increase of	removal of
		732 children	airport noise level				reading	airport from high
		aged 11yrs;	was reduced (2010				comprehension	noise area in
		second testing,	and 2011 testing)				over time was not	2010).

		2010: 650 children aged 12.3yrs; third testing, 2011: 178 children aged 13.1yrs Longitudinal study; follow-up period: 3 years (2009-2011)	Noise source: aircraft predominant, other source was road traffic Noise metrics: Leq (dBA)				related to groups or time; the removal of aircraft noise did not lead to improved reading comprehension Type of analyses : repeated multiple analyses of covariance (MANCOVA) Sample size relating to the effect size : n=93 from high noise group and n=85	Findings: Significant confounding role of home language on reading comprehension. Increase of reading comprehension in both groups over time.
							from low noise	
Longitudin	al Evidence						0.000	
3.	Clark et al, J	Population:	Noise exposure:	Compared to:	Confounding:	Outcome:	Findings:	Comments:
	Enviro Psychol,	school children,	aircraft noise	noise levels at	age, gender,	Reading	Increase of	Findings:
	2013	total n=461,	levels at primary	secondary	employment,	comprehension –	aircraft noise at	For the majority
		aged 15-16yrs.	and secondary	schools	home ownership,	Suffolk Reading	secondary school	of children noise
		sampling	in an area from 7	compared to	nome crowding,	Scale (SKS2) Level	by I dB was non-	exposure levels
		haseline sample	am to 11 nm· road	nrimary	educational	(Hagley 2002)	associated with a	secondary
		tested in 2001-	traffic noise at	schools	attainment.	(108109, 2002)	decrease of the	schools were
		2003: 1355	school combined	00110010	long-standing		performance on	similar, some
		children aged 9-	from		illness, parental		reading test by	children moved
		10yrs; follow-up	measurements		support for school		0.022 marks	from quieter to
		sample testing in	and models		work at baseline,		(unadjusted), or	noisier schools,
		2008: 1015	available for		classroom glazing		0.016 marks	and vice versa.
		children eligible	elementary		at primary school		(adjusted)	
		for testing, 461	schools				Type of analyses:	
		children	Noise source:				Multilevel linear	

	participated, aged 15-16; response rate 45.4% Longitudinal study; follow-up period: 6 years (2001/2003- 2008)	aircraft and road traffic Noise metrics : LAeq, 16h (dBA)				regression analyses Sample size relating to the effect size: n=461 with complete data	
Psycho 2002 a	gge et al, I Sci, pove						
4. Haines J E 2001	et al, Int pidemiol, school children, noisy and quiet schools around the airport, total n=275, aged 8- 11yrs. Sampling procedure: baseline sample tested in 1996: n=340 children; follow-up sample tested in 1997: response rate 81%, n=275 Longitudinal study at two time points	Noise exposure: aircraft noise levels modelled around schools; acute noise exposure measured inside classrooms Noise source: aircraft noise Noise metrics: LAeq, 16h (dBA) Noise groups: High-aircraft noise-impact schools (Leq, 16h >66 dBA), low- aircraft noise- impact schools (Leq, 16h <57 dBA)	Comparison: children from noisy schools around compared to children from quiet schools	Confounding: Age, household deprivation score – incorporating income, home ownership, unemployment, adapted from Townsend's Scale (Townsend, et al, 1989), main language spoken at home	Outcome: Reading comprehension – Suffolk Reading Scale (SRS2) Level 2 and Level 3 (Hagley, 2002) Sustained Attention – score task from Tests of Everyday Attention for Children (TEA- Ch) (Manly et al, 1998)	Findings: Children from high-aircraft noise schools had poorer reading comprehension and poorer sustained attention. Type of analyses: Analyses of covariance ANCOVA Sample size relating to the effect size: n=148 from high- aircraft noise exposed schools, n=127 from low- aircraft noise	Comments: At follow-up, reading comprehension was poorer among children from high-aircraft noise schools, but non-significant after adjustment. This implies that the effect of noise on reading comprehension may be influenced by socio- demographic factors.
See Se J Exp	abi et al, Science					exposed schools	

	Eviron Epidem,							
	2013 above							
Cross-sect	ional Studies			ſ	ſ	1	ſ	1
5.	Clark et al, Am J	Population:	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	Epidemiol, 2006	school children,	aircraft noise	lower levels	age, gender,	Reading	Increase of	Findings:
		89 schools	levels at home and	of noise	country, mother's	comprehension	aircraft noise at	Significant
		around three	at school	exposure	education,	Suffolk Reading	school by 1 dBA	correlation
		airports, total	measured in an		parental	Scale Level 2	correlated to	between aircraft
		n=2010, aged 9-	area from 7 am to		employment	(SRS2) (Hagley,	decrease of the	noise at home
		10yrs.	11 pm; road traffic		status, home	2002), CITO	performance on	and at school;
		Sampling: 3207	noise at school		crowding, home	Readibility Index	the reading test	No correlation
		children	modelled or		ownership, long-	for elementary and	by	between road
		approached;	combination of		standing illness,	Special Education	0.008 marks;	traffic noise at
		2844 pupils	measurements		main language	(Staphorsius,	Increase of	school and
		participated;	with models		spoken at home,	1994), Ecaluacion	aircraft noise at	reading
		response rate:	Noise source:		parental support	Comprension	home by 1 dBA	comprehension;
		89% of children,	aircraft and road		for schoolwork,	Lectora ECL-2 (De	correlated to	findings
		80% of parents	traffic		classroom glazing;	La Cruz, 1999);	decrease of the	consistent across
		Cross sectional	Noise metrics:		dyslexia, hearing	Episodic memory	performance on	all three
		study	LAeq, 16h (dBA)		impairment,	- Child Memory	the reading test	countries
					noise during	scale, (Cohen,	by	
					testing; aircraft	1997); Sustained	0.008 marks	
					noise annoyance,	attention –	Type of analyses:	
					cognitive	Toulouse Pieron	multilevel model	
					outcomes,	test (Toulouse et	analyses (for data	
					country	al, 1986);	clustering)	
						Working memory	Sample size	
						 Search and 	relating to the	
						Memory test	effect size:	
						(Smith and Miles,	n=2010 with	
						1987; Hygge et al,	complete data	
						2003)		
6.	Clark et al, Am J	Population:	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	Epidemol, 2012	school children,	aircraft noise	lower levels	Modelled	Reading	Increase of	Findings:
		total n=960,	levels at home and	of noise	concentrations of	comprehension	aircraft noise at	Moderate
		aged 9-10yrs.	at school	exposure	NO2 (μg/m3);	Suffolk Reading	school by 1 dBA	correlation

		Cross sectional	measured in an		Socio-economic	Scale Level 2	correlated to	between NO2
		study	area from 7 am to		status	(SRS2) (Hagley,	decrease of the	levels and aircraft
			11 pm; road traffic		(employment,	2002), CITO	performance on	noise and road
			noise at school		housing tenure,	Readibility Index	the following	traffic noise.
			combined from		home crowding),	for elementary and	tests: reading	No association
			measurements		maternal	Special Education	comprehension	between road
			and models		education,	(Staphorsius,	(by 0.01 marks),	traffic noise and
			Noise source:		ethnicity, main	1994), Ecaluacion	recognition	reading
			aircraft and road		language spoken	Comprension	memory (by	comprehension
			traffic		at home; age,	Lectora ECL-2 (De	0.045 marks),	
			Noise metrics:		gender, long-	La Cruz, 1999);	information recall	
			LAeq, 16h (dBA)		standing illness,	Episodic memory	(by 0.043 marks)	
					parental support	tested with Child	and conceptual	
					for schoolwork,	Memory scale,	recall (by 0.015	
					classroom glazing;	(Cohen, 1997)	marks).	
					other noise		Type of analyses:	
					exposure source		Multilevel linear	
							and logistic	
							regression models	
							Sample size	
							relating to the	
							effect size:	
							n=719 with air	
							pollution data and	
							n=241 without air	
							pollution data	
7.	Haines,	Population:	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	Stansfeld,	school children,	aircraft noise	Children from	Household	Reading	Children in high	Findings:
	Brentnall et al,	20 schools, total	levels modelled	high aircraft	deprivation score	comprehension –	noise schools had	No difference in
	Psychol Med,	n=451, aged 8-	around schools	noise schools	 incorporating 	Suffolk Reading	poor performance	reading,
	2001	11yrs. Noisy and	Noise source:	compared	income, home	Scale (SRS2) Level	on the difficult	immediate recall,
		quiet schools	aircraft noise	with children	tenure, car	2 (Hagley, 2002);	items (20% of all	delayed recall,
		matched for age,	Noise metrics:	from lower	ownership,	Long-term	items) of the	recognition
		sex, other noise	LAeq, 16h (dBA)	aircraft noise	employment,	memory –	reading scale.	memory,
		sources, noise	Noise groups:	level schools	central heating,	including	Type of analyses:	sustained
		protection at	noisy schools (Leq,		social class and	immediate recall,	Analysis of	attention and

		school, socio- economic status, main language; Response rate	16h >63 dBA), quiet schools (Leq, 16h <57 dBA)		household crowding (Townsend, et al, 1989), age, main	delayed recall, and recognition – adapted from Child Memory	covariance (ANCOVA), Multilevel modeling analysis	serial backward digit recall between children from high-level
		Cross-sectional			at home	1997);	relating to the	schools and
		study				Backward serial	effect size: n=451	children from low
						digit recall	(n=236 from high-	level noise
						(Pickering and	level noise	schools.
						Gathercole, 2000);	schools, n=215	
						Attention	from low-level	
						task from Tests of	noise schools)	
						Everyday Attention		
						for Children (TEA-		
						Ch) (Manly et al,		
						1998)		
8.	Haines,	Population:	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	-	•	•	•	0		0	
	Stansfeld, Job	school children,	aircraft noise	Children from	Household	Reading	Children in high	Findings:
	Stansfeld, Job et al, Psychol	school children, 8 schools, total	aircraft noise levels modelled	Children from high aircraft	Household deprivation score	Reading comprehension –	Children in high noise schools had	Findings: Acute aircraft
	Stansfeld, Job et al, Psychol Med, 2001	school children, 8 schools, total n=340, aged 8-	aircraft noise levels modelled around schools;	Children from high aircraft noise schools	Household deprivation score – incorporating	Reading comprehension – Suffolk Reading	Children in high noise schools had poor performance	Findings: Acute aircraft noise exposure at
	Stansfeld, Job et al, Psychol Med, 2001	school children, 8 schools, total n=340, aged 8- 11yrs. Noisy and quiat schools	aircraft noise levels modelled around schools; acute noise levels	Children from high aircraft noise schools compared with childron	Household deprivation score – incorporating income, crowding,	Reading comprehension – Suffolk Reading Scale (SRS2) Level 2 (Hagloy 2002):	Children in high noise schools had poor performance on the reading	Findings: Acute aircraft noise exposure at the time of tosting was not
	Stansfeld, Job et al, Psychol Med, 2001	school children, 8 schools, total n=340, aged 8- 11yrs. Noisy and quiet schools matched for age	aircraft noise levels modelled around schools; acute noise levels measured indoors	Children from high aircraft noise schools compared with children from lower	Household deprivation score – incorporating income, crowding, home ownership,	Reading comprehension – Suffolk Reading Scale (SRS2) Level 2 (Hagley, 2002); Long-term	Children in high noise schools had poor performance on the reading scale than children from low	Findings: Acute aircraft noise exposure at the time of testing was not associated with
	Stansfeld, Job et al, Psychol Med, 2001	school children, 8 schools, total n=340, aged 8- 11yrs. Noisy and quiet schools matched for age, sex. other noise	aircraft noise levels modelled around schools; acute noise levels measured indoors Noise source: aircraft noise	Children from high aircraft noise schools compared with children from lower aircraft noise	Household deprivation score – incorporating income, crowding, home ownership, unemployment, (Townsend, et al.	Reading comprehension – Suffolk Reading Scale (SRS2) Level 2 (Hagley, 2002); Long-term memory –	Children in high noise schools had poor performance on the reading scale than children from low noise schools	Findings: Acute aircraft noise exposure at the time of testing was not associated with reading
	Stansfeld, Job et al, Psychol Med, 2001	school children, 8 schools, total n=340, aged 8- 11yrs. Noisy and quiet schools matched for age, sex, other noise sources, noise	aircraft noise levels modelled around schools; acute noise levels measured indoors Noise source: aircraft noise Noise metrics:	Children from high aircraft noise schools compared with children from lower aircraft noise level schools	Household deprivation score – incorporating income, crowding, home ownership, unemployment, (Townsend, et al, 1989), age, main	Reading comprehension – Suffolk Reading Scale (SRS2) Level 2 (Hagley, 2002); Long-term memory – including	Children in high noise schools had poor performance on the reading scale than children from low noise schools (even after	Findings: Acute aircraft noise exposure at the time of testing was not associated with reading comprehension
	Stansfeld, Job et al, Psychol Med, 2001	school children, 8 schools, total n=340, aged 8- 11yrs. Noisy and quiet schools matched for age, sex, other noise sources, noise protection at	aircraft noise levels modelled around schools; acute noise levels measured indoors Noise source: aircraft noise Noise metrics: LAeq, 16h (dBA)	Children from high aircraft noise schools compared with children from lower aircraft noise level schools	Household deprivation score – incorporating income, crowding, home ownership, unemployment, (Townsend, et al, 1989), age, main language spoken	Reading comprehension – Suffolk Reading Scale (SRS2) Level 2 (Hagley, 2002); Long-term memory – including recognition task	Children in high noise schools had poor performance on the reading scale than children from low noise schools (even after adjustment for	Findings: Acute aircraft noise exposure at the time of testing was not associated with reading comprehension or annoyance.
	Stansfeld, Job et al, Psychol Med, 2001	school children, 8 schools, total n=340, aged 8- 11yrs. Noisy and quiet schools matched for age, sex, other noise sources, noise protection at school, socio-	aircraft noise levels modelled around schools; acute noise levels measured indoors Noise source : aircraft noise Noise metrics : LAeq, 16h (dBA) outdoors; single	Children from high aircraft noise schools compared with children from lower aircraft noise level schools	Household deprivation score – incorporating income, crowding, home ownership, unemployment, (Townsend, et al, 1989), age, main language spoken at home	ReadingcomprehensionSuffolkReadingScaleScale2 (Hagley, 2002);Long-termmemory-includingrecognitiontaskandrecalltask	Children in high noise schools had poor performance on the reading scale than children from low noise schools (even after adjustment for deprivation, age,	Findings: Acute aircraft noise exposure at the time of testing was not associated with reading comprehension or annoyance. Conclusion:
	Stansfeld, Job et al, Psychol Med, 2001	school children, 8 schools, total n=340, aged 8- 11yrs. Noisy and quiet schools matched for age, sex, other noise sources, noise protection at school, socio- economic status,	aircraft noise levels modelled around schools; acute noise levels measured indoors Noise source : aircraft noise Noise metrics : LAeq, 16h (dBA) outdoors; single event noise	Children from high aircraft noise schools compared with children from lower aircraft noise level schools	Household deprivation score – incorporating income, crowding, home ownership, unemployment, (Townsend, et al, 1989), age, main language spoken at home	Reading comprehension – Suffolk Reading Scale (SRS2) Level 2 (Hagley, 2002); Long-term memory – including recognition task and recall task (Evans et al, 1995);	Children in high noise schools had poor performance on the reading scale than children from low noise schools (even after adjustment for deprivation, age, language).	Findings: Acute aircraft noise exposure at the time of testing was not associated with reading comprehension or annoyance. Conclusion: The association
	Stansfeld, Job et al, Psychol Med, 2001	school children, 8 schools, total n=340, aged 8- 11yrs. Noisy and quiet schools matched for age, sex, other noise sources, noise protection at school, socio- economic status, ethnic groups;	aircraft noise levels modelled around schools; acute noise levels measured indoors Noise source: aircraft noise Noise metrics: LAeq, 16h (dBA) outdoors; single event noise exposure level	Children from high aircraft noise schools compared with children from lower aircraft noise level schools	Household deprivation score – incorporating income, crowding, home ownership, unemployment, (Townsend, et al, 1989), age, main language spoken at home	Reading comprehension – Suffolk Reading Scale (SRS2) Level 2 (Hagley, 2002); Long-term memory – including recognition task and recall task (Evans et al, 1995); Short-term	Children in high noise schools had poor performance on the reading scale than children from low noise schools (even after adjustment for deprivation, age, language). Children in high	Findings: Acute aircraft noise exposure at the time of testing was not associated with reading comprehension or annoyance. Conclusion: The association between aircraft
	Stansfeld, Job et al, Psychol Med, 2001	school children, 8 schools, total n=340, aged 8- 11yrs. Noisy and quiet schools matched for age, sex, other noise sources, noise protection at school, socio- economic status, ethnic groups; Response rate	aircraft noise levels modelled around schools; acute noise levels measured indoors Noise source : aircraft noise Noise metrics : LAeq, 16h (dBA) outdoors; single event noise exposure level (SEL dBA); LAeq	Children from high aircraft noise schools compared with children from lower aircraft noise level schools	Household deprivation score – incorporating income, crowding, home ownership, unemployment, (Townsend, et al, 1989), age, main language spoken at home	Reading comprehension – Suffolk Reading Scale (SRS2) Level 2 (Hagley, 2002); Long-term memory – including recognition task and recall task (Evans et al, 1995); Short-term memory – serial	Children in high noise schools had poor performance on the reading scale than children from low noise schools (even after adjustment for deprivation, age, language). Children in high noise schools had	Findings: Acute aircraft noise exposure at the time of testing was not associated with reading comprehension or annoyance. Conclusion: The association between aircraft noise exposure
	Stansfeld, Job et al, Psychol Med, 2001	school children, 8 schools, total n=340, aged 8- 11yrs. Noisy and quiet schools matched for age, sex, other noise sources, noise protection at school, socio- economic status, ethnic groups; Response rate 77%	aircraft noise levels modelled around schools; acute noise levels measured indoors Noise source : aircraft noise Noise metrics : LAeq, 16h (dBA) outdoors; single event noise exposure level (SEL dBA); LAeq during time	Children from high aircraft noise schools compared with children from lower aircraft noise level schools	Household deprivation score – incorporating income, crowding, home ownership, unemployment, (Townsend, et al, 1989), age, main language spoken at home	Reading comprehension – Suffolk Reading Scale (SRS2) Level 2 (Hagley, 2002); Long-term memory – including recognition task and recall task (Evans et al, 1995); Short-term memory – serial digit recall task;	Children in high noise schools had poor performance on the reading scale than children from low noise schools (even after adjustment for deprivation, age, language). Children in high noise schools had poor long-term	Findings: Acute aircraft noise exposure at the time of testing was not associated with reading comprehension or annoyance. Conclusion: The association between aircraft noise exposure and reading
	Stansfeld, Job et al, Psychol Med, 2001	school children, 8 schools, total n=340, aged 8- 11yrs. Noisy and quiet schools matched for age, sex, other noise sources, noise protection at school, socio- economic status, ethnic groups; Response rate 77% Cross-sectional	aircraft noise levels modelled around schools; acute noise levels measured indoors Noise source : aircraft noise Noise metrics : LAeq, 16h (dBA) outdoors; single event noise exposure level (SEL dBA); LAeq during time needed for task	Children from high aircraft noise schools compared with children from lower aircraft noise level schools	Household deprivation score – incorporating income, crowding, home ownership, unemployment, (Townsend, et al, 1989), age, main language spoken at home	Reading comprehension – Suffolk Reading Scale (SRS2) Level 2 (Hagley, 2002); Long-term memory – including recognition task and recall task (Evans et al, 1995); Short-term memory – serial digit recall task; Motivation –	Children in high noise schools had poor performance on the reading scale than children from low noise schools (even after adjustment for deprivation, age, language). Children in high noise schools had poor long-term memory than	Findings: Acute aircraft noise exposure at the time of testing was not associated with reading comprehension or annoyance. Conclusion: The association between aircraft noise exposure and reading comprehension is
	Stansfeld, Job et al, Psychol Med, 2001	school children, 8 schools, total n=340, aged 8- 11yrs. Noisy and quiet schools matched for age, sex, other noise sources, noise protection at school, socio- economic status, ethnic groups; Response rate 77% Cross-sectional study	aircraft noise levels modelled around schools; acute noise levels measured indoors Noise source : aircraft noise Noise metrics : LAeq, 16h (dBA) outdoors; single event noise exposure level (SEL dBA); LAeq during time needed for task completion	Children from high aircraft noise schools compared with children from lower aircraft noise level schools	Household deprivation score – incorporating income, crowding, home ownership, unemployment, (Townsend, et al, 1989), age, main language spoken at home	Reading comprehension – Suffolk Reading Scale (SRS2) Level 2 (Hagley, 2002); Long-term memory – including recognition task and recall task (Evans et al, 1995); Short-term memory – serial digit recall task; Motivation – performance	Children in high noise schools had poor performance on the reading scale than children from low noise schools (even after adjustment for deprivation, age, language). Children in high noise schools had poor long-term memory than children from low	Findings: Acute aircraft noise exposure at the time of testing was not associated with reading comprehension or annoyance. Conclusion: The association between aircraft noise exposure and reading comprehension is independent from poice
	Stansfeld, Job et al, Psychol Med, 2001	school children, 8 schools, total n=340, aged 8- 11yrs. Noisy and quiet schools matched for age, sex, other noise sources, noise protection at school, socio- economic status, ethnic groups; Response rate 77% Cross-sectional study	aircraft noise levels modelled around schools; acute noise levels measured indoors Noise source : aircraft noise Noise metrics : LAeq, 16h (dBA) outdoors; single event noise exposure level (SEL dBA); LAeq during time needed for task completion Noise groups :	Children from high aircraft noise schools compared with children from lower aircraft noise level schools	Household deprivation score – incorporating income, crowding, home ownership, unemployment, (Townsend, et al, 1989), age, main language spoken at home	Reading comprehension – Suffolk Reading Scale (SRS2) Level 2 (Hagley, 2002); Long-term memory – including recognition task and recall task (Evans et al, 1995); Short-term memory – serial digit recall task; Motivation – performance measure, i.e.	Children in high noise schools had poor performance on the reading scale than children from low noise schools (even after adjustment for deprivation, age, language). Children in high noise schools had poor long-term memory than children from low noise schools (antice schools	Findings: Acute aircraft noise exposure at the time of testing was not associated with reading comprehension or annoyance. Conclusion: The association between aircraft noise exposure and reading comprehension is independent from noise

			16h >66 dBA).			and solvable	without bias).	noise levels, age.
			quiet schools (Leg.			puzzle (Evans et al.	No effect of noise	language. and
			16h <57 dBA)			1995):	exposure on	deprivation.
						Child Attributional	motivation. self-	
						Style – measured	reported	
						by Child	attributional scale	
						Attribution Style	and classroom	
						Questionnaire	motivation.	
						(CASQ: Kaslow &	Type of analyses:	
						Nolen-Hoeksema.	Analysis of	
						1991):	covariance	
						Classroom	(ANCOVA)	
						motivation. i.e.	Sample size	
						learned	relating to the	
						helplessness –	effect size: n=340	
						estimated by	(n=169 from high-	
						teachers using	level noise	
						Student Behaviour	schools, n=171	
						Checklist (SBC;	from low-level	
						Fincham et	noise schools)	
						al. 1989)	,	
9.	Klatte et al,	Population: 85	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
	Report, NORAH	second-grade	Noise contours at	Change	Migrant	Reading test:	A 10 dB increase	Methods:
	study, 2014	classes from 29	school and at	estimate per	background.	standardized	in aircraft noise	Impossible to
		primary schools	home around	10 dBA	Children's	comprehension	associated with a	separate home
		around	airport	increase	exposure to road	test for primary	decrement of	and schools
		Frankfurt/Main	Noise source:		traffic and railway	school children	one-tenth of an	exposure (high
		airport; children:	aircraft noise		noise. Also used	(ELFE 1-6, Lenhard	SD on the reading	correlation).
		total n=1243,	Noise metrics: Leq		as confounders:	& Schneider,	test,	Findings:
		age 8yrs,	around schools		auditory thinking,	2006).	corresponding to	Significant
		4months	(time 8-14h);		phonological	Language	a one month	confounding of
		Cross-sectional	average 49.5 dB,		awareness,	functions - speech	reading delay in	migrant
		study	Median 50.6 dB;		episodic memory.	perception,	this test.	background –
			range 39 to 59 dB;		Class	auditory thinking,	Similar results for	aircraft noise
			Leq at home (6-		characteristics	phonological	subscales: word	(both home and
			18h)		(size, proportion	short-term	and text	school) strongly

			Noise groups: 3 groups at school: low exposure < 47 dB; middle exposure 47 to < 55 dB; high exposure ≥ 55 dB		of migrants, socioeconomic status, parental engagement), classroom reverberation and insulation.	memory, phonological awareness, episodic memory test. Other outcomes : Health-related quality of life, well- being at home and school, noise annoyance at home and school.	comprehension. Similar results found for aircraft noise at home. Type of analyses: Multilevel regression Sample size relating to the effect size: n=1090	affects reading comprehension of children without migration background (1.5- 2.5 months reading delay). No effect of aircraft noise on tested language functions. Aircraft noise at school and at home significantly associated with annoyance . Aircraft noise was associated with less positive judgments of health-related quality of life , well-being at school, and sleep
10		a 1 .:						quality.
10.	Matsui et al, Noise Health	Population : school children	Noise exposure:	comparator: children from	Age sex schools	Outcome: Reading	Findings: Aircraft noise	Findings:
	2004	high aircraft	levels at home and	homes with	household	comprehension	levels at home	between aircraft
		noise exposure	at school	low noise	deprivation score	Suffolk Reading	significantly	noise levels at
		at school, three	modelled	levels (LAeq,	(including income,	Scale Level 2	predict poor	home and
		groups of aircraft	Noise source:	16h < 63 dB)	home tenure, car	(Hagley, 1987);	performance at	delayed
		noise exposure	aircraft noise	compared to	ownership,	Long term	immediate recall	recognition,
		at home; total	Noise metrics:	children from	employment,	Memory Recall	and delayed recall	sustained
		n=451, aged 8-	LAeq, 16h (dB)	schools with	central heating,	and Recognition –	tests.	attention and

	9yrs, response rate: 83% in high noise schools and 81% in low noise schools Cross sectional study	Noise groups: All children attending schools with high levels of aircraft noise (LAeq, 16h > 63 dB), but with different levels of aircraft noise at home (LAeq, 16h < 63dB vs. LAeq, 16h =63-66 dB, vs.	higher noise levels (LAeq, 16h =63-66 dB), and to the highest noise levels (LAeq, 16h > 63 dB)	household crowding, social class), mother's educational level, long-standing illness, main language spoken at home	tested with Children's Memory scale (Cohen, 1997); Sustained Attention tested with Tests of Everyday Attention for Children (TEA- Ch) (Manly et al, 1998)	Type of analyses:MultiplelogisticregressionanalysesSamplesizerelatingtotheeffect size:n=163withcomplete data	reading comprehension.
11. Seabi et al, Noise Health, 2012	Population: school children from five schools, 834 children approached, sample n=693, aged 9-14yrs. Inclusion criteria: minimum of 2 yrs of residence in the study area, normal hearing (perceived by parents or teachers), being in grade 5 or 6 Exclusion criteria: learning difficulties, auditory processing	LAeq, 16h > 63 dB) Noise exposure: noise levels measured outside schools from 8 am to 10:00 am Noise groups: high noise group – schools near aircraft flight path Noise source: aircraft noise Noise metrics: Leq (dBA)	Compared to: low noise group – schools in quiet urban areas	Confounding: Age, gender, race, home language (English first language, English second language), socio-economic deprivation (eligible for free meal at school), intellectual ability (tested with the Figure Analogies subtest of the Quantitative Battery for Cognitive Abilities Test (Lohman et al, 2001))	Outcome: Reading comprehension – tested using Suffolk Reading Scale Level 2 (SRS2) (Hagley, 2002)	Findings: Children from high aircraft noise groups had lower reading comprehension scores compared to low noise group. Type of analyses: Not mentioned in the paper; possibly MANCOVA; univariate general linear model Sample size relating to the effect size: n=313 from high noise group and n=380 from low noise group	Comments: Findings: Children whose first language is English had higher reading comprehension scores; the effect remained stable after adjusting for gender, intellectual ability and socio- economic status; significant interaction between noise and primary language spoken.

		disorders and/or attentional problems Cross sectional study						
12.	Stansfeld et al,	Population:	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	Lancet, 2005	school children,	aircraft noise	lower levels	age, gender,	Reading	Increase of	Findings:
		89 schools	levels at home and	of noise	parental	comprehension	aircraft noise at	No association
		around three	at school	exposure	employment,	Suffolk Reading	school by 1 dBA	between aircraft
		airports, total	measured in an		home ownership,	Scale Level 2	correlated to	and road traffic
		n=2844, aged 9-	area from 7 am to		home crowding,	(SRS2) (Hagley,	decrease of the	noise and cued
		13yrs.	11 pm; road traffic		mother's	2002), CITO	performance on	conceptual recall,
		Cross sectional	noise at school		educational	Readibility Index	the reading test	cued information
		study	modelled or		attainment,	for elementary and	by	recall,
			combination of		long-standing	Special Education	0.008 marks;	prospective
			measurements		illness, main	(Staphorsius,	Increase of	memory, working
			with models		language spoken	1994), Ecaluacion	aircraft noise at	memory, and
			Noise source:		at home, parental	Comprension	school by 1 dBA	sustained
			aircraft and road		support for school	Lectora ECL-2 (De	correlated to	attention.
			traffic		work, classroom	La Cruz, 1999);	decrease of the	
			Noise metrics:		glazing	Episodic memory	performance on	
			LAeq, 16h (dBA)			– Child Memory	the recognition	
						scale, (Cohen,	test by 0.018	
						1997); Sustained	marks.	
						attention –	Increase of road	
						Toulouse Pieron	traffic noise by 1	
						test (loulouse et	dB was associated	
						al, 1986);	with an increase	
						working memory	of information	
						– Search and	recall by 0.038	
						(Smith and Miles	incrosco of	
						1087: Hyggo of al	concentual recall	
						1907, Hygge et al,	by 0.012 marks	
						Prospective	Type of analyses	
						memory (writing	Multilevel model	

						initials as	analyses (for data	
						instructed)	clustering)	
							Sample size	
							relating to the	
							effect size: range	
							from 1939 to	
							2014 with	
							complete data	
13.	Stansfeld,	Population:	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
	Hygge, Clark et	school children,	aircraft noise	Munich	Munich study:	Munich study:	Munich study: No	Findings:
	al, Noise	two studies re-	levels measured	study:	self-reported	Reading test in	association	RANCH study:
	Health, 2010	analysed.	around schools in	children from	sleep quality;	German	between	Daytime and
		Munich study:	Munich study;	noisy schools	RANCH study:	(Biglmaier,	nighttime aircraft	nighttime noise
		n=326, aged 9-	modeled in	around the	daytime aircraft	1969) in noisy	noise and	exposure highly
		11yrs, around	RANCH study	old and the	noise at school,	conditions (80	cognitive	correlated.
		old and new	Noise source:	new airport	road-traffic noise,	dBA)	impairment	Nighttime aircraft
		airport	aircraft noise	compared to	sleep problems,	Long-term	(mediated by	exposure was no
		Inclusion criteria:	Noise metrics:	children from	age, sex, parental	memory – recall of	sleep quality).	longer associated
		2 years of	Munich study: Leq,	quiet schools	employment,	a text read in noisy	RANCH study:	with impaired
		residence,	24h (dBA);	around the	crowding,	conditions the	Increase of	reading
		speaking	RANCH study: Leq,	old and the	homeownership,	previous day.	nighttime aircraft	comprehension
		German fluently	nighttime at home	new airport.	mother's	RANCH study:	noise at home by	and recognition
		Longitudinal	(dBA) (11 p.m. to 7	RANCH study:	education, child's	Reading	1 dBA correlated	memory after
		study; baseline	a.m.)	higher levels	illness, main	comprehension	to decrease of the	adjustment for
		(wave 1): 6		of aircraft	language at home,	Suffolk Reading	reading test	daytime aircraft
		months before		noise	parental support	Scale Level 2	performance by	noise at school.
		the opening of		exposure	for home work,	(SRS2) (Hagley,	0.009 marks, and	
		new airport,		compared to	classroom glazing	2002),	to decrease of	
		follow-up 1 and		lower levels		Episodic memory	recognition	
		2 years (waves 2		of noise		– Child Memory	memory by 0.031	
		and 3) after				Scale, (Cohen,	marks.	
		changeover of				1997); Sustained	Type of analyses:	
		airports				attention –	Multilevel	
		RANCH study:				Toulouse Pieron	modeling	
		n=857, aged 9-				test (Toulouse et	Sample size	
		10yrs, around				al, 1986);	relating to the	

		the airport					Working memory	effect size:	
		Cross-sectional					– Search and	n=326 (Munich	
		study					Memory test	study), n=842 for	
							(Smith and Miles,	RANCH study	
							1987: Hygge et al.		
							2003)		
14.	Evans and	Population:	Noise	exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
	Maxwell, Enviro	school children,	flight	contours	Children from	Mother's	Reading skills –	Chronic exposure	Findings:
	Behav, 1997	two schools of	modele	d outside	a high-noise	education, income	Woodcock Reading	to aircraft noise	Speech
	,	similar socio-	schools		school		Mastery Test	was inversely	perception was a
		economic	Noise	source:	compared to		(Woodcock, 1987):	, correlated with	mediator
		characteristics.	aircraft	noise	children from		Speech perception	reading scores	between noise
		language and	Noise m	etrics:	a quiet school		– exposure to	and speech	exposure and
		ethnicity, total	LAea (di	3A)			noise-masked	perception. Noise	poor reading
		n=116. aged 5-	Noise	groups:			words (Carrol et al.	was significant	skills.
		7vrs.	high-noi	se school			1971):	predictor of low	
		Cross-sectional	(within	65 dBA			Sound perception	reading scores.	
		study	flight co	ontour) vs.			– exposure to	after adjustment	
			nuiet sc	hool			noise-masked	for mother's	
			quiet se				environmental	education	
							sounds (Brady et	Type of analyses:	
							al 1983).	Linear regression	
							Embedded	correlation	
							nhoneme test -	Samle size	
							prioriente test –	rolating to the	
							perception of	offect sizes p=116	
							different words	effect size: II-110	
							(Fowler 1000)		
							(FOWIEI, 1990)	<u> </u>	
Cross cost	ional Evidence	UKE							
CI055-Secti	Soo Stansfold							1	
	ot al Lancet								
	et al, Lancet,								
	2005 above								
	See Clark et al,								
	Am J Epidemiol,								
	2006								1

Reference	Population:	Exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	general	exposure to high	no noise	adjusted for	assessment of	expressed as	Anything else to
	population in	levels of	exposure or	confounding	outcome	effect per dB if	note
	settings	environmental	lower levels			possible.	
	(hospitals,	noise from various	of noise				
	residences,	noise sources	exposure			Type of analyses	
	public venues,	+ noise metric					
	educational	involved +				Sample size	
	facilities) +	modelled or				relating to the	
	response rate	measured noise				effect size	
	and other						
	selection /bias						
	factors						
	Cross-sectional						
	or longitudinal						

Aircraft Noise Exposure	
Intervention Evidence	

1.	Eagan et al, ,	Population:	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
	2004	school children,	noise levels	Change in test	Prior test score,	Standardized tests	Noise reduction	Methods:
		35 schools	modeled for	scores	prior noise	 scores on two 	was associated	Intervention /
		around 3	school year, school	compared to	exposure, cause	mandatory tests –	with a decrease	noise abatement
		airports, total	months, and	change in	of airport's	verbal and	in failure rate in	study
		n=unspecified,	school hours;	noise	noise reduction	math/science	high school	Findings:
		aged 6-18yrs.	converted to	reduction	combined with	(average score,	pupils, but not in	Reduction in
		Selection:	indoor noise		testing state,	failure rate, i.e. %	middle-school	percent of time
		schools that	Noise source:		test-regime	children with	and elementary	LAeq>40 dBA by
		experienced	aircraft noise		change in one	lowest score, top-	school pupils.	5% points was
		reduction in	Noise metrics:		state; age	score rate – i.e. %	Reduction in	associated with
		noise levels (due	LAeq, school day (7		groups	children with the	percent of time	improvement of
		to commercial	a.m. to 4 p.m.);		(elementary,	best score)	LAeq>40 dBA by	average scores
		airport closure or	speech		middle, and high		5% points was	by 7-9% points.
		due to school	interference level		school); student		associated with	Reduction in the
		sound insulation)	(SIL), including		group		reduction of	number of
			percent of time		(individualized		failure rate in	events with
		Cross-sectional	LAeq>40 dBA;		education		high school pupils	LAmax>40 dBA
		study	number of events		program IEP and		by 20% points,	by 20 events was
		Intervention	with LAmax >40		non-IEP)		and with	associated with
		study	dBA; speech				reduction of top-	improvement of
			intelligibility index				score rate in	average scores
			(SII) – number of				children with	by 4-5% points in
			events disrupting				disabilities (IEP)	elementary
			speech				by 5% points.	school pupils,
							Type of analyses:	but with a
							Multi-variate	decrease of
							multilevel	average scores
							regression	by 17-19% points
							Sample size	in high school
							relating to the	pupils.
							effect size:	
			1			1	n=not specified	

2.	FICAN et al,				
	2007 – see				
	Eagan et al,				
	2004 above.				

3.	Sharp et al,	Population: 6198	Noise exposure:	Comparison:	Confounding:	Outcomes:	Cross-sectional	Comments:
	Report, ACRP	schools around	noise levels	Change	Eligible for free	School average	findings:	Method:
	Document, 2014	46 airports, data	modeled for	estimate per	meal, school's	test scores on	An increase in	Comparison
		collected 2000-	school year, school	10 dBA	enrollment of	reading and	aircraft noise by	between
		2008; children:	months, and	increase	children from	mathematics;	10 dBA was	schools, not
		total	school hours		minority groups,	converted to	related to a	between
		n=unspecified,	Noise source:		pupil-teacher	index.	decrease in state	children.
		age unspecified,	aircraft noise		ratio, average	(Scores are not	ranking of a	Findings:
		3 rd , 4 th , 5 th grade	Noise metrics: fro		enrollment per	comparable	school by 1	When aircraft
		Cross-sectional	ambient noise:		grade in the	between states.	percentile. An	noise is 5 dBA
		study and	Ldn: for school		school	but comparable	increase in	greater than
		Intervention	noise at school			across schools in	ambient noise by	ambient noise.
		study –	hours (7a.m. –			the same state and	10 dBA was	the percentile
		examined effects	3p.m.): Lmax. SEL.			vear). Scores were	related to a	decrease in state
		after sub-sample	Leg. time above a			further adjusted	decrease in state	ranking (of a
		of schools had	threshold noise			and normalized to	ranking of a	school) is 3%.
		sound insulation	level (TA), number			allow between-	school by 3	The effect of
		installed.	of events above a			state comparisons	percentiles.	aircraft noise
		motoneou	threshold noise			– percentile of	An increase in	was greater for
			level (NA)			state ranking.	incremental noise	non-
			Noise groups:				by 10 dBA was	disadvantaged
			target schools (Ldn				related to a	children than for
			≥55 dBA: n=917)				decrease in state	disadvantaged
			vs. control schools				ranking of a	children.
			(not exposed to				school by 6	
			aircraft noise) vs.				percentiles.	
			insulated schools				Intervention	
			(n=173)				findings: In a	
			· · · ·				sub-sample of	
							119 schools, the	
							effect of aircraft	
							noise on	
							children's	
							learning	
							disappeared once	
							the school had	
							sound insulation	
							installed.	
							Type of analyses:	
							Multilevel	
							regression, GLM	
							procedure	
							Sample size	
							relating to the	
							effect size:	
							n=not specified	

Longitudinal Evidence

4.	Cohen et l, J	Population: school	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	Person Social	children, noisy and	aircraft noise	Children from	Number of	California Test of	Longitudinal testing:	Findings:
	Psychol, 1981	quiet schools around	levels measured	noisy	children in the	Basic Skills –	children from noisy	No effect of
		the airport, first	inside the	classrooms	family, grade	reading and	schools were less	noise on reading
	Cohen et al,	testing n=262, second	classroom for 1	compared to	in school,	mathematics	distractible; more	achievement or
	American	testing n=163, age	hour in the	children from	months	tests (California	often failed solving	auditory
	Scientist,	unknown (third and	morning and in the	noise-abated	enrolled in	Assessment	the puzzles, solved	discrimination
	1981.	fourth grade, possibly	afternoon	classrooms	school, race,	Program, 1976)	puzzles for longer	between
		9-10yrs)	Noise source:	and to	cognitive	Auditory	time; and had higher	classrooms. No
		Sampling procedure:	aircraft noise	children from	aptitude test,	discrimination	levels of noise	impact of noise
		Noisy and quiet	Noise metrics:	quiet schools.	performance	test – ability to	perception than	on distraction
		schools matched for	peak level, L33,	Longitudinal	under ambient	discriminate	children in quiet	between noisy,
		age, grade, ethnic and	LAeq 1h (dBA)	analyses of	conditions	between pairs of	schools.	abated and quiet
		racial distribution,		children who		words (Wepman,	Cross-sectional:	classrooms.
		families with		moved from		1958)	children from noisy	
		assistance, parental		noisy to		Distractibility	classrooms more	
		educational and		noise-abated		test – a crossing	often failed the puzzle	
		occupational level		classroom in		out Es test under	test in comparison to	
		Exclusion criterion:		contrast to		ambient and	children from noise-	
		hearing impairment		children who		distracting	abated and quiet	
		(audiometric		remained in		conditions	rooms.	
		screening)		noisy rooms.		(Cohen et al,	Type of analyses:	
		Longitudinal study;				1980)	Regression analyses	
		follow-up period: 1				Helplessness –	Sample size relating	
		year (1977-1978)				tested by speed	to the effect size:	
		Cross-sectional study:				of solving a	n=163 for longitudinal	
		comparison between				solvable puzzle	analysis, i.e. n=83	
		noisy, noise-abated				after trying to	from noisy schools	
		and quiet classrooms				solve an	and n=80 from quiet	
						unsolvable puzzle	schools	
						Perception of	n=262 for cross-	
						noise –	sectional analysis, i.e.	
						questionnaire for	n=97 from noisy, n=45	
						children	from noise-abated,	
							and n=120 from quiet	
							classrooms	

5.	Cohen et al,	See Cohen et l, J						
	American	Person Social Psychol,						
	Scientist,	1981						
	1981.							
Cross-se	ctional Evidence							
6.	Haines et al, J	Population: school	Noise exposure:	Comparison:	Confounding:	Outcome:	Findings:	Comments:
	Epidemiol	children, 123 schools	aircraft noise	Children from	Age, gender,	National	Increase of aircraft	Findings:
	Community	around the airport,	levels modelled	schools with	social	Standardized	noise by contour band	No effect of
	Health, 2002	total n=11000, aged	around schools	different	deprivation	Scores (SATs) for	was significantly	noise on
		11yrs.	Noise source:	noise levels	(free meal),	Key Stage 2 in	associated with a	performance in
		Cross-sectional study	aircraft noise		main language	mathematics,	decrease of the	science and
			Noise metrics:		spoken at	science, English	performance in	English test
			LAeq, 16h (dBA)		home, child	(including four	reading test by 0.42	subscales.
			Noise groups:		with special	subscales:	marks (unadjusted),	Noise-school
			schools classified		need, type of	spelling,	and a decrease in	performance
			into eight		school	handwriting,	mathematics by 0.73	relationship was
			exposure levels			creative writing	marks (unadjusted).	influenced by
			depending on			and reading)	Type of analyses:	socioeconomic
			aircraft noise				Multilevel modeling	factors.
			contour band				analysis (hierarchical	
			(from below 54 to				data)	
			above 72 dBA)				Sample size relating	
							to the effect size:	
							n=11000	

7.	Green et al,	Population: school	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
	Arch Enviro	children from 362	flight contours	Dose-	Black origin,	Reading –	Aircraft noise	Findings:
	Health, 1982	schools, collected	modeled outside	response	Puerto Rican	obtained from an	exposure was	Linear dose-
		over 5 years (1972-	schools		origin,	annual nationally	positively correlated	response
		1976), total	Noise source:		absentee rate,	standardized	with percentage of	relationship
		n=unknown, age	aircraft noise		eligibility for	test; expressed as	children reading	between noise
		unspecified (2 nd to 6 th	Noise metrics:		free lunch,	percentage of	below grade level.	score values and
		grade).	none		teachers'	students reading	An increase of noise	percent reading
		Cross-sectional study	Noise groups: five		experience	1 or more years	score was associated	below grade
			school groups			below grade	with an increase of	level was
			according to noise			level.	0.62% in the number	suggested.
			exposure				of students reading 1	
			contours, each				and more years below	
			school assigned a				grade level.	
			noise score				Type of analyses:	
							Linear regression	
							Sample size relating	
							to the effect size:	
							n=unknown	
Road Tra	affic Noise Exposu	ire						
Cross-se	ctional Evidence							

8.	Cohen et al, J	Population: school	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	Experim Soc	children, total n=54,	noise levels were	Children who	Audiometric	Auditory	Children living in noisy	Methods:
	Psychol, 1973	2 nd , 3 rd , 4 th and 5 th	measured outside	lived in noisy	testing,	discrimination -	apartments ≥4 years	Floor level used
		grade (age not	the buildings,	buildings ≥4	parent's	measured by	had positive	for noise
		specified);	inside the	years were	educational	Auditory	correlation between	exposure in
		Sampling procedure:	buildings	compared to	level, floor	Discrimination	auditory	analyses but
		73 children	(hallways), and	children who	level, length of	test (Wepman,	discrimination and	groupings
		approached, exclusion	inside of the	lived in noisy	residence,	1958);	reading test, positive	confirmed by
		criteria: poor	apartments (living	buildings ≤ 3	school grade,	Reading –	correlation between	noise
		knowledge of English,	room)	years	number of	including word	floor level and	measurement.
		not living at the	Noise source: road		children in	vocabulary,	auditory	Findings:
		building of interest,	traffic		family	reading	discrimination	Duration of
		absence, disturbance	Noise metrics: not			comprehension	(adjustment for	residence is
		on testing day,	specified (dBA)			and reading total	parent's education);	related to
		hearing deficit at	Noise groups:			tested by the	positive correlation	impairment in
		audiometric test.	children who lived			Metropolitan	between floor and	auditory
		Cross sectional study	in the noisy			Achievement	reading test scores	discrimination.
			buildings ≥4 years,			Reading Test	(adjustment for	Floor level
			children who lived			(Durost et al,	parent's education).	accounts for the
			in noisy buildings ≤			1971);	Type of analyses:	variance of
			3 years			Stroop Color-	Correlation, partial	auditory
						word test –	correlation, stepwise	discrimination.
						Uleman and	regression analysis	Auditory
						Reeves, 1971	Sample size relating	discrimination
							to the effect size:	and mother's
							n=54 (n=34 living ≥4	education
							years, n=20 living \leq 3	account for the
							years in noisy	total variance in
							buildings)	reading test
								score.
								Conclusion:
								The role of noise
								exposure in
								reading
								impairment is
								indirect (through
								auditory
								discrimination).

9.	Lukas et al,	Population: school	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
	Report,	children, 15 schools	noise levels	Quiet vs.	Classroom	Reading and	3 rd and 6 th -grade	Method:
	Department	socio-economically	measured outside	noisy schools	assignment,	mathematics –	pupils from noisy	Some quiet
	of Health	comparable, total	schools, in the		socio-	tested on	schools had poorer	schools were
	Services, 1981	n=1826, age	community, and		economic	Comprehensive	achievement in	exposed to other
		unspecified (3 rd and	indoors (in		(income,	Test of Basic	reading and	sources of noise
		6 th grade).	classrooms)		percentage of	Skills	mathematics in	 the selection
		Cross-sectional study	Noise source: road		poverty), race	(standardized	comparison to	of school was
			traffic noise		(White, Black,	test, School	children from quiet	based on the
			Noise metrics:		Hispanic),	District);	schools. 3 rd -graders	distance from a
			LAeq 24-hour, L ₁ ,		community	Classroom or	were 0.4 years behind	freeway, not on
			L ₁₀ , L ₉₀ , L ₉₉ (dBA)		noise exposure	grade-level	in reading and 0.2	actual noise
			Noise groups:		for each	education –	years behind in	levels.
			noisy area		school,	tested on	mathematics. 6 th	Findings:
			(L ₉₉ =53.4 dBA) vs.		English-	California	graders from noisy	Non-English
			quiet area		speaking vs.	Assessment	school were 0.7 years	speaking
			(L ₉₉ =47.5 dBA)		Non-English-	Program	behind in reading.	children had
					speaking	(California	Type of analyses:	poorer results in
						Department of	Multiple regression	reading and
						Education)	Sample size relating	mathematics in
							to the effect size:	comparison to
							n=1826	English-speaking
								children.

10.	Shield ar	nd	Population: school	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
	Dockrell,	J	children, 142 schools	ambient noise	Correlation	Free school	National	External noise levels	Findings:
	Acoust So	с	from three boroughs,	levels measured	between	meals, English	Standardized	were negatively	For younger
	Am, 2008		total n=unspecified,	outside and inside	noise levels	as an	Scores (SATs) for	correlated with all	children –
			aged 7 and 11yrs.	schools	and scores in	additional	Key Stage 1	average test scores of	correlation was
			Cross-sectional study	Noise source:	children from	language, child	(reading, writing,	KS1 and KS2 in	significant with
				road-traffic noise	suburban and	with special	spelling,	suburban schools, but	LA90 (i.e. they
				Noise metrics:	urban schools	education	mathematics)	not in urban schools.	are affected by
				external noise:		needs	and Key Stage 2	External noise was	external
				LAeq, LAmax,			(English, science,	significantly	background
				LA90, LA10;			mathematics)	associated poor KS1	noise); for older
				internal noise:				mathematics in	children –
				LAeq, LA90				suburban schools, and	correlation was
								with poor KS1 and KS2	significant with
								English in urban	LAmax (more
								schools.	affected by
								Internal noise was	individual
								significantly	external noise
								associated with poor	events).
								KS1 mathematics, and	Negative
								with all K2 scores.	correlation
								Type of analyses:	between noise
								Correlation and	and scores
								regression analysis	significant in
								Sample size relating	older children
								to the effect size:	after adjustment
								n=unknown	(possibly more
									affected than
									younger
								1	children).

11.	Puiol et al. J	Population: school	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	Urban Health.	children. 35 schools.	noise levels	lower levels	Household	National	Ambient noise levels	Findings:
	2014	different noise	modelled outside	of noise at	socio-	standardized	at home were	Children who
		exposure at school	homes (24 hours)	home and at	economic	assessment test	negatively associated	already repeated
		and home, total	and schools (from	school	status,	in French and	with scores in French	a school year
		n=586, aged 8-9yrs.	6 am to 6 pm)		employment,	mathematics	(unadjusted), but not	were exposed to
		Sampling: 964	Noise source:		parental		with mathematics	, higher Lden at
		children approached,	ambient noise,		educational		score.	homes than the
		746 interviewed	predominantly		level, age, sex,		Ambient noise levels	other pupils (by
		(response rate	road traffic		main language		at school were	2 dBA)
		77.4%), 587 with valid	Noise metrics: At		spoken at		negatively associated	
		tests	school: LAeq, day		home, reading		with scores in French	
		Exclusion criteria:	(dBA)		as leisure		(unadjusted and	
		change of residence,	At home: Lden		activity		adjusted), and with	
		hearing impairment	(dBA)				mathematics score	
		Cross sectional study					(unadjusted for	
							confounders).	
							Increase of noise by 1	
							dBA at school was	
							associated with a	
							decrease of French	
							score and	
							mathematics score by	
							approx 0.5 points.	
							Type of analyses:	
							Multilevel linear	
							regression model	
							Sample size relating	
							to the effect size:	
							n=587 with complete	
							data in French, n=586	
							with complete data in	
							mathematics	
Railway	Noise Exposure							
Interven	tion Evidence							

12.	Bronzaft, J	Population: school	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	Enviro	children, first testing:	noise levels were	Children from	none	Reading	Before noise	Methods: This is
	Psychol, 1981	n=350, 2 nd , 3 rd , 5 th and	measured inside	noisy		achievement –	abatement: Children	not a follow-up
		6 th grade (age not	one classroom of	classrooms		tested by the	on the noisy side of	study because
		specified); second	the school	compared to		California	the school had poorer	children change
		testing: n=605, 2 nd ,	Noise source:	children from		Achievement	reading achievement	classrooms every
		3 rd , 5 th and 6 th grade	subway trains	the quiet		Test (CTB-	compared to children	year – the two
		(age not specified);	running at	classrooms		McGraw hill,	from quiet	samples (before
		noisy and quiet	elevated tracks			1977)	classrooms.	and after
		classes matched for	Noise metrics: not				After noise	abatement)
		intelligence and	specified (dBA)				abatement: Children	were
		achievement and	Noise groups:				on both sides of the	independent
		teaching method.	noisy classrooms				building had similar	
		Cross-sectional study:	(during train				reading scores.	
		comparison between	passing L=89 dBA)				Type of analyses:	
		noisy, and quiet	and quiet				Analysis of variance;	
		classrooms before (in	classrooms (noise				Chi-square test	
		1978) and after noise	level not				Sample size relating	
		abatement (in	specified).				to the effect size:	
		1980/1981)	After noise				n=350 at first testing,	
		Intervention: noise	abatement				n=605 at second	
		abatement measures	intervention noise				testing	
		performed at the	levels reduced in					
		source (change or	noisy classrooms					
		rubber pads for the	by 6-8 dBA (during					
		tracks) and inside	train passing L=81-					
		school (sound	83 dBA)					
		absorbing ceilings						
		installed)						
Cross-se	ctional Evidence							

13.	Bronzaft and	Population: school	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings: Children on	Comments:
	McCarthy,	children, total n=161,	noise levels were	Children and	none	Attitudes toward	the noisy side of the	Findings:
	Enviro Behav,	2^{nd} , 4^{th} and 6^{th} grade	measured inside	classes on the		the noise	school had poorer	Children on
	1975	(age not specified);	one classroom of	noisy side of		designed for the	reading achievement	noisy side felt
		children from noisy	the school	school		purposes of the	performance (word	that there was
		and quiet classes	Noise source:	compared to		study (similar to	knowledge and	too much noise
		(total n=14 classes)	subway trains	children and		Fitzroy and Reid,	reading	in the classroom,
		matched for	running at	classes		1963) available	comprehension)	that noise made
		intelligence and	elevated tracks	located on		for 212 children	compared to children	it hard for them
		achievement test.	Noise metrics: not	the quiet side		Reading	from quiet	to do their work,
		Cross sectional study	specified (dBA)	of school		achievement –	classrooms.	and that subway
			Noise groups:			including word	Classes on the noisy	trains bothered
			noisy classrooms			knowledge,	side of the building	them or made it
			(average L=59			reading	had lower mean	hard for them to
			dBA; during train			comprehension	reading scores than	think. They also
			passing L=89 dBA)			and general	classes on quiet side	more often
			and quiet			reading tested by	of the school.	rated their
			classrooms (noise			the Metropolitan	Type of analyses:	classroom as
			level not specified)			Achievement	Analysis of variance;	noisy or very
						Reading Test	Chi-square test	noisy.
						(Durost et al,	Sample size relating	
						1971) – available	to the effect size:	
						for 161 children	n=212 children tested	
						and average	individually;	
						values available	n=14 classes of	
						for all classes	children with average	
							scores	

Table S3:	Characteristics of	of included studies	s for environmer	ntal §noise effects d	on long-term & :	short-term memorv
			. je. e			

Reference	Population:	Exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:	
	general	exposure to high	no noise	adjusted for	assessment of	expressed as	Anything else to	
	population in	levels of	exposure or	confounding	outcome	effect per dB if	note	
	settings	environmental	lower levels			possible.		
	(hospitals,	noise from various	of noise					
	residences,	noise sources	exposure			Type of analyses		
	public venues,	+ noise metric						
	educational	involved +				Sample size		
	facilities) +	modelled or				relating to the		
	response rate	measured noise				effect size		
	and other							
	selection /bias							
	factors							
	Cross-sectional							
	or longitudinal							
Aircraft Noise Exposure								
Intervention Evidence								

1.	Hygge et al,	Population:	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
	Psychol Sci,	school children,	aircraft noise	children from	None	Reading test in	At the new	Findings:
	2002	noisy and quiet	levels measured	noisy schools		German	airport children	The effect of
		schools around	around schools	around the		(Biglmaier,	showed a	noise on the
		the old and the	before and after	old and the		1969),	decrease of the	reading tasks was
		new airport,	relocation of the	new airport		Long-term	number of	not mediated by
		total n=326,	airport;	compared to		memory – recall of	correct answers	memory or
		aged 8-12yrs.	Noise source:	children from		a text read in noisy	on long-term	speech
		Four groups:	aircraft noise	quiet schools		conditions the	memory task,	perception.
		n=43 old-airport,	Noise metrics:	around the		previous day,	and impairment	Poorer reading
		no-noise; n=65	Leq, 24h (dBA)	old and the		Short-term	of speech	was not
		old-airport plus		new airport		memory –	perception.	mediated by
		noise; n=107				remembering	At the old airport	speech
		new-airport, no-				consonants),	children showed	perception, and
		noise; n=111				Attention – visual	decrease in the	impaired recall
		new-airport plus				search and	number of errors	was in part
		noise				reaction time were	on reading test,	mediated by
		Inclusion				tested in both	increase of the	reading.
		criteria:				quiet and noisy	number of	
		2 years of				conditions,	correct answers	
		residence,				Speech perception	on short-term	
		speaking				 hearing a story 	memory task,	
		German fluently,				against noisy	and improvement	
		normal hearing				background	of speech	
		(assessed by				(adapted from	perception.	
		audiometric				Hygge, Rönnberg,	Type of analyses:	
		screening)				Larsby, Arlinger,	t-test for	
		Longitudinal				1992)	independent	
		study; baseline					samples,	
		(wave 1): 6					multivariate	
		months before					analyses of	
		the opening of					variance	
		new airport,					MANOVA	
		tollow-up 1 and					Sample size	
		2 years (waves 2					relating to the	
		and 3) after					effect size:	
		changeover of					n=326	
		airports						
		Intervention						
		Study						

Longitudinal evidence									
See Hygge et al, Psychol Sci,									
2002 above									
Cross-sectional evidence									

2.	Clark et al, Am J	Population:	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	Epidemol, 2012	school children,	aircraft noise	lower levels	Modelled	Reading	Increase of	Findings:
		total n=960,	levels at home and	of noise	concentrations of	comprehension	aircraft noise at	Moderate
		aged 9-10yrs.	at school	exposure	NO2 (μg/m3);	Suffolk Reading	school by 1 dBA	correlation
		Cross sectional	measured in an		Socio-economic	Scale Level 2	correlated to	between NO2
		study	area from 7 am to		status	(SRS2) (Hagley,	decrease of the	levels and aircraft
			11 pm; road traffic		(employment,	2002), CITO	performance on	noise and road
			noise at school		housing tenure,	Readibility Index	the following	traffic noise.
			combined from		home crowding),	for elementary	tests: reading	No association
			measurements		maternal	and Special	comprehension	between road
			and models		education,	Education	(by 0.01 marks),	traffic noise and
			Noise source:		ethnicity, main	(Staphorsius,	recognition	reading
			aircraft and road		language spoken	1994), Ecaluacion	memory (by	comprehension
			traffic		at home; age,	Comprension	0.045 marks),	
			Noise metrics:		gender, long-	Lectora ECL-2 (De	information recall	
			LAeq <i>,</i> 16h (dBA)		standing illness,	La Cruz, 1999);	(by 0.043 marks)	
					parental support	Episodic memory	and conceptual	
					for schoolwork,	tested with Child	recall (by 0.015	
					classroom glazing;	Memory scale,	marks).	
					other noise	(Cohen, 1997)	Type of analyses:	
					exposure source		Multilevel linear	
							and logistic	
							regression	
							models	
							Sample size	
							relating to the	
							effect size:	
							n=719 with air	
							pollution data	
							and n=241	
							without air	
							pollution data	

3.	Haines,	Population:	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	Stansfeld,	school children,	aircraft noise	Children from	Household	Reading	Children in high	Findings:
	Brentnall et al,	20 schools, total	levels modelled	high aircraft	deprivation score	comprehension –	noise schools had	No difference in
	Psychol Med,	n=451, aged 8-	around schools	noise schools	 incorporating 	Suffolk Reading	poor	reading,
	2001	11yrs. Noisy and	Noise source:	compared	income, home	Scale (SRS2) Level	performance on	immediate recall,
		quiet schools	aircraft noise	with children	tenure, car	2 (Hagley, 2002);	the difficult items	delayed recall,
		matched for age,	Noise metrics:	from lower	ownership,	Long-term	(20% of all items)	recognition
		sex, other noise	LAeq <i>,</i> 16h (dBA)	aircraft noise	employment,	memory –	of the reading	memory,
		sources, noise	Noise groups:	level schools	central heating,	including	scale.	sustained
		protection at	noisy schools (Leq,		social class and	immediate recall,	Type of analyses:	attention and
		school, socio-	16h >63 dBA),		household	delayed recall, and	Analysis of	serial backward
		economic status,	quiet schools (Leq,		crowding	recognition –	covariance	digit recall
		main language;	16h <57 dBA)		(Townsend, et al,	adapted from	(ANCOVA),	between children
		Response rate			1989), age, main	Child Memory	Multilevel	from high-level
		82%			language spoken	Scale (Cohen,	modeling analysis	aircraft noise
		Cross-sectional			at home	1997);	Sample size	schools and
		study				Backward serial	relating to the	children from low
						digit recall	effect size: n=451	level noise
						(Pickering and	(n=236 from	schools.
						Gathercole, 2000);	high-level noise	
						Sustained	schools, n=215	
						Attention – score	from low-level	
						task from Tests of	noise schools)	
						Everyday Attention		
						for Children (TEA-		
						Ch) (Manly et al,		
						1998)		

4.	Haines.	Population:	Noise exposure	Comparator:	Confounding	Outcome:	Findings:	Comments:
	Stansfeld. Job	school children.	aircraft noise	Children from	Household	Reading	Children in high	Findings:
	et al, Psychol	8 schools, total	levels modelled	high aircraft	deprivation score	comprehension –	noise schools had	Acute aircraft
	Med, 2001	n=340, aged 8-	around schools;	noise schools	 incorporating 	Suffolk Reading	poor	noise exposure at
		11yrs. Noisy and	acute noise levels	compared	income, crowding,	Scale (SRS2) Level	performance on	the time of
		quiet schools	measured indoors	with children	home ownership,	2 (Hagley, 2002);	the reading scale	testing was not
		matched for age,	Noise source:	from lower	unemployment,	Long-term	than children	associated with
		sex, other noise	aircraft noise	aircraft noise	(Townsend, et al,	memory –	from low noise	reading
		sources, noise	Noise metrics:	level schools	1989), age, main	including	schools (even	comprehension
		protection at	LAeq, 16h (dBA)		language spoken	recognition task	after adjustment	or annoyance.
		school, socio-	outdoors; single		at home	and recall task	for deprivation,	Conclusion:
		economic status,	event noise			(Evans et al, 1995);	age, language).	The association
		ethnic groups;	exposure level			Short-term	Children in high	between aircraft
		Response rate	(SEL dBA); LAeq			memory – serial	noise schools had	noise exposure
		77%	during time			digit recall task;	poor long-term	and reading
		Cross-sectional	needed for task			Motivation –	memory than	comprehension is
		study	completion			performance	children from low	independent
			Noise groups:			measure, i.e.	noise schools	from noise
			noisy schools (Leq,			solving insolvable	(only a	annoyance, acute
			16h >66 dBA),			and solvable	subsample	noise levels, age,
			quiet schools (Leq,			puzzle (Evans et al,	without bias).	language, and
			16h <57 dBA)			1995);	No effect of noise	deprivation.
						Child Attributional	exposure on	
						Style – measured	motivation, self-	
						by Child	reported	
						Attribution Style	attributional	
						Questionnaire	scale and	
						(CASQ; Kaslow &	classroom	
						Nolen-Hoeksema,	motivation.	
						1991); Classroom	Type of analyses:	
						Classroom motivation i o	Analysis of	
						Inotivation, i.e.		
							(ANCOVA) Sample size	
						actimated by	relating to the	
						teachers using	effect size n=3/0	
						Student Rehaviour	(n=169 from	
						Checklist (SBC·	high-level noise	
						Fincham et	schools n=171	
						al. 1989)	from low-level	
						,	noise schools)	

5.	Stansfeld et al,	Population:	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	Lancet, 2005	school children,	aircraft noise	lower levels	age, gender,	Reading	Increase of	Findings:
		89 schools	levels at home and	of noise	parental	comprehension	aircraft noise at	No association
		around three	at school	exposure	employment,	Suffolk Reading	school by 1 dBA	between aircraft
		airports, total	measured in an		home ownership,	Scale Level 2	correlated to	and road traffic
		n=2844, aged 9-	area from 7 am to		home crowding,	(SRS2) (Hagley,	decrease of the	noise and cued
		13yrs.	11 pm; road traffic		mother's	2002), CITO	performance on	conceptual recall,
		Cross sectional	noise at school		educational	Readibility Index	the reading test	cued information
		study	modelled or		attainment,	for elementary	by	recall,
			combination of		long-standing	and Special	0.008 marks;	prospective
			measurements		illness, main	Education	Increase of	memory, working
			with models		language spoken	(Staphorsius,	aircraft noise at	memory, and
			Noise source:		at home, parental	1994), Ecaluacion	school by 1 dBA	sustained
			aircraft and road		support for school	Comprension	correlated to	attention.
			traffic		work, classroom	Lectora ECL-2 (De	decrease of the	
			Noise metrics:		glazing	La Cruz, 1999);	performance on	
			LAeq, 16h (dBA)			Episodic memory	the recognition	
						– Child Memory	test by 0.018	
						scale, (Cohen,	marks.	
						1997); Sustained	Increase of road	
						attention –	traffic noise by 1	
						Toulouse Pieron	dB was	
						test (Toulouse et	associated with	
						al, 1986);	an increase of	
						Working memory	information recall	
						– Search and	by 0.038 marks	
						Memory test	and an increase	
						(Smith and Miles,	of conceptual	
						1987; Hygge et al,	recall by 0.013	
						2003);	marks.	
						Prospective	Type of analyses:	
						memory (writing	Multilevel model	
						initials as	analyses (for data	
						instructed)	clustering)	
							Sample size	
							relating to the	
							frame 1020 to	
							110m 1939 to	
							2014 With	
						1	complete data	

6.	Stansfeld,	Population:	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
	Hygge, Clark et	school children,	aircraft noise	Munich	Munich study:	Munich study:	Munich study:	Findings:
	al, Noise	two studies re-	levels measured	study:	self-reported	Reading test in	No association	RANCH study:
	Health, 2010	analysed.	around schools in	children from	sleep quality;	German	between	Daytime and
		Munich study:	Munich study;	noisy schools	RANCH study:	(Biglmaier,	nighttime aircraft	nighttime noise
		n=326, aged 9-	modeled in	around the	daytime aircraft	1969) in noisy	noise and	exposure highly
		11yrs, around	RANCH study	old and the	noise at school,	conditions (80	cognitive	correlated.
		old and new	Noise source:	new airport	road-traffic noise,	dBA)	impairment	Nighttime aircraft
		airport	aircraft noise	compared to	sleep problems,	Long-term	(mediated by	exposure was no
		Inclusion criteria:	Noise metrics:	children from	age, sex, parental	memory – recall of	sleep quality).	longer associated
		2 years of	Munich study: Leq,	quiet schools	employment,	a text read in noisy	RANCH study:	with impaired
		residence,	24h (dBA);	around the	crowding,	conditions the	Increase of	reading
		speaking	RANCH study: Leq,	old and the	homeownership,	previous day.	nighttime aircraft	comprehension
		German fluently	nighttime at home	new airport.	mother's	RANCH study:	noise at home by	and recognition
		Longitudinal	(dBA) (11 p.m. to 7	RANCH study:	education, child's	Reading	1 dBA correlated	memory after
		study; baseline	a.m.)	higher levels	illness, main	comprehension	to decrease of	adjustment for
		(wave 1): 6		of aircraft	language at home,	Suffolk Reading	the reading test	daytime aircraft
		months before		noise	parental support	Scale Level 2	performance by	noise at school.
		the opening of		exposure	for home work,	(SRS2) (Hagley,	0.009 marks, and	
		new airport,		compared to	classroom glazing	2002),	to decrease of	
		follow-up 1 and		lower levels		Episodic memory	recognition	
		2 years (waves 2		of noise		 Child Memory 	memory by 0.031	
		and 3) after				Scale, (Cohen,	marks.	
		changeover of				1997); Sustained	Type of analyses:	
		airports				attention –	Multilevel	
		RANCH study:				Toulouse Pieron	modeling	
		n=857, aged 9-				test (Toulouse et	Sample size	
		10yrs, around				al, 1986);	relating to the	
		the airport				Working memory	effect size:	
		Cross-sectional				– Search and	n=326 (Munich	
		study				Memory test	study), n=842 for	
						(Smith and Miles,	RANCH study	
						1987; Hygge et al,		
						2003)		

7.	Matheson et al,	Population:	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	Noise Health,	school children,	aircraft noise	lower levels	age, gender,	Episodic memory	Increase of road	Findings:
	2010	89 schools	levels at home and	of noise	country, socio-	(including	traffic noise by 1	Aircraft noise
		around three	at school	exposure	economic status	information recall,	dB was	was not
		airports, total	measured or		(employment,	conceptual recall,	associated with	significantly
		n=2844, aged 9-	modeled in an		home ownership,	recognition	an increase of	related to either
		13yrs.	area; road traffic		home crowding),	memory) tested	information recall	information
		Sampling: 3207	noise at school		mother's	with Children's	by 0.038 marks	recall or
		children	combined from		educational	Memory scale	and an increase	conceptual recall.
		approached;	measurements		attainment,	(Cohen, 1997);	of conceptual	Road traffic noise
		2844 pupils	and models; acute		long-standing	Prospective	recall by 0.013	was not
		participated;	noise		illness, main	memory test	marks.	significantly
		response rate:	measurements		language spoken	(Shield and	Increase of	related to either
		89% of children,	Noise source:		at home, parental	Dockrell, 2002)	aircraft noise by	recognition
		80% of parents	aircraft and road		support for school		1 dB was	memory or
		Cross sectional	traffic		work, other noise		associated with a	prospective
		study	Noise metrics:		source; dyslexia,		decrease of	memory.
			LAeq, 16h (dBA)		acute noise during		recognition	
					testing		memory by 0.018	
							marks but was	
							not related to	
							prospective	
							memory.	
							Type of analyses:	
							Multilevel linear	
							regression	
							analyses	
							Sample size	
							relating to the	
							effect size:	
							n=2844 with	
							complete data	

8.	Matsui et al,	Population:	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Findings:
	Noise Health,	school children,	aircraft noise	children from	Age, sex, schools,	Reading	Aircraft noise	No association
	2004	high aircraft	levels at home and	homes with	household	comprehension	levels at home	between aircraft
		noise exposure	at school	low noise	deprivation score	Suffolk Reading	significantly	noise levels at
		at school, three	modelled	levels (LAeq,	(including income,	Scale Level 2	predict poor	home and
		groups of aircraft	Noise source:	16h < 63 dB)	home tenure, car	(Hagley, 1987);	performance at	delayed
		noise exposure	aircraft noise	compared to	ownership,	Long term	immediate recall	recognition,
		at home; total	Noise metrics:	children from	employment,	Memory Recall	and delayed	sustained
		n=451, aged 8-	LAeq, 16h (dB)	schools with	central heating,	and Recognition –	recall tests.	attention and
		9yrs, response	Noise groups: All	higher noise	household	tested with	Type of analyses:	reading
		rate: 83% in high	children attending	levels (LAeq,	crowding, social	Children's Memory	Multiple logistic	comprehension.
		noise schools	schools with high	16h =63-66	class), mother's	scale (Cohen,	regression	
		and 81% in low	levels of aircraft	dB), and to	educational level,	1997);	analyses	
		noise schools	noise (LAeq, 16h >	the highest	long-standing	Sustained	Sample size	
		Cross sectional	63 dB), but with	noise levels	illness, main	Attention tested	relating to the	
		study	different levels of	(LAeq, 16h >	language spoken	with Tests of	effect size:	
			aircraft noise at	63 dB)	at home	Everyday Attention	n=163 with	
			home (LAeq, 16h <			for Children (TEA-	complete data	
			63dB vs. LAeq, 16h			Ch) (Manly et al,		
			=63-66 dB, vs.			1998)		
			LAeq, 16h > 63 dB)					

9. va	an Kempen et	Population:	Noise exposure:	Compared to:	Confounding:	Outcome:	Findings:	Comments:
al,	l, Enviro	school children	home and school	lower levels	Age, gender, main	1)	Positive and	Findings:
He	ealth, 2010	from 24 schools	addresses for each	of noise	language spoken	Neurobehavioral	significant	Significant
		around	children linked to	exposure	at home, long-	evaluation system	relation between	correlation
		Amsterdam	modelled noise		standing illness,	(NES) tests (Letz,	aircraft noise	between aircraft
		airport, 620	levels		parental support	1001): Simple	exposure at	and road traffic
		children	Noise source:		for school work,	Reaction Time	school and the	noise levels.
		approached,	aircraft and road		school glazing,	Test, Switching	number of errors	No relation
		total sample	traffic		socio-economic	Attention Test,	on Switching	between aircraft
		n=553, aged 9-	Noise metrics:		status (crowding,	Hand-Eye-	Attention test	noise exposure at
		11yrs	LAeq 7-23h (dBA)		home ownership,	Coordination Test,	(SAT).	school and other
		Cross-sectional	for aircraft noise;		parental	Symbol-Digit	Positive and	NES tests; no
		study	LAeq 7-23h (dBA)		employment,	Substitution Test,	significant	relation between
			for road traffic		mother's	Digit Memory Span	relation between	aircraft noise
			noise		education), the	Test.	road traffic noise	exposure at
					other noise source	2) Other cognitive	at school and the	home and
						outcomes:	number of errors	cognitive
						Reading	on SAT test	outcomes.
						comprehension	Type of analyses:	No relation
						(CRIE test,	multilevel model	between road
						Staphorsius, 1994);	analyses by	traffic noise
						Prospective	MIXED procedure	exposure at
						memory (writing	Sample size	nome and
						initials where	relating to the	cognitive
						Instructed);	effect size: n=433	outcomes.
						Child Momory	complete data	
						(Child Weillory	complete data	
						1007): Working		
						momory (Soarch		
						and Momory tost		
						Hygge et al 2002).		
						Sustained		
						attention		
						(Toulouse Pieron		
						test. Toulouse et		
						al. 1986)		

10.	van Kempen et	Population:	Noise exposure:	Compared to:	Confounding:	Outcomes:	Findings:	Comments:
	al, Enviro Res,	school children	home and school	lower levels	Modelled	Neurobehavioral	Positive and	Findings:
	2012	from 24 schools	addresses for each	of noise	concentrations of	evaluation system	significant	Positive
		around	children linked to	exposure	NO2 (µg/m3) and	(NES) tests (Letz,	relation between	correlation
		Amsterdam	modelled noise		particulate matter	1001): Simple	road traffic noise	between aircraft
		airport, 620	levels		(PM10);	Reaction Time	at school and the	and road traffic
		children	Noise source:		Age, gender, main	Test, Switching	number of errors	noise levels at
		approached,	aircraft and road		language spoken	Attention Test,	on SAT test;	home and school;
		total sample	traffic		at home, long-	Hand-Eye-	Positive and	positive
		n=553, aged 9-	Noise metrics:		standing illness,	Coordination Test,	significant	correlation
		11yrs	LAeq 7-23h (dBA)		parental support	Symbol-Digit	relation between	between NO2
		Cross-sectional	for aircraft noise;		for school work,	Substitution Test,	aircraft noise at	and PM10 at
		study	LAeq 7-23h (dBA)		school glazing,	Digit Memory Span	school and the	home and school.
			for road traffic		socio-economic	Test.	number of errors	NO2 level at
			noise		status (crowding,		on SAT test; both	school
					home ownership,		significant after	significantly
					parental		adjustment for	associated with
					employment,		NO2	span length
					mother's		concentration at	measured with
					education)		school.	DMST.
							Type of analyses:	No relation
							multilevel model	between aircraft
							analyses by	and road traffic
							MIXED procedure	noise exposure at
							Sample size	home and
							relating to the	cognitive
							effect size: n=485	outcomes.
							children with	Combined
							complete data	exposure to NO2
								and road traffic
								noise had effect
								on reaction times
								measured with
								SRTT and the
								number of errors
								on SAT.

11.	Klatte et al,	Population: 85	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
	Report, NORAH	second-grade	Noise contours at	Change	Migrant	Reading test:	A 10 dB increase	Methods:
	study, 2014	classes from 29	school and at	estimate per	background.	standardized	in aircraft noise	Impossible to
		primary schools	home around	10 dBA	Children's	comprehension	associated with a	separate home
		around	airport	increase	exposure to road	test for primary	decrement of	and schools
		Frankfurt/Main	Noise source:		traffic and railway	school children	one-tenth of an	exposure (high
		airport; children:	aircraft noise		noise. Also used	(ELFE 1-6, Lenhard	SD on the	correlation).
		total n=1243,	Noise metrics: Leq		as confounders:	& Schneider,	reading test,	Findings:
		age 8yrs,	around schools		auditory thinking,	2006).	corresponding to	Significant
		4months	(time 8-14h);		phonological	Language	a one month	confounding of
		Cross-sectional	average 49.5 dB,		awareness,	functions - speech	reading delay in	migrant
		study	Median 50.6 dB;		episodic memory.	perception,	this test.	background –
			range 39 to 59 dB;		Class	auditory thinking,	Similar results for	aircraft noise
			Leq at home (6-		characteristics	phonological	subscales: word	(both home and
			18h)		(size, proportion	short-term	and text	school) strongly
			Noise groups:		of migrants,	memory,	comprehension.	affects reading
			3 groups at school:		socioeconomic	phonological	Similar results	comprehension
			low exposure < 47		status, parental	awareness,	found for aircraft	of children
			dB; middle		engagement),	episodic memory	noise at home.	without
			exposure 47 to <		classroom	test.	No association	migration
			55 dB; high		reverberation and	Other outcomes:	between aircraft	background (1.5-
			exposure ≥ 55 dB		insulation.	Health-related	noise exposure	2.5 months
						quality of life, well-	(39-59dB LAeq	reading delay).
						being at home and	8am-2pm) and a	No effect of
						school, noise	test of	aircraft noise on
						annoyance at	phonological	tested language
						home and school.	short-term	functions.
							memory	Aircraft noise at
							Type of analyses:	school and at
							Multilevel	home
							regression	significantly
							Sample size	associated with
							relating to the	annoyance.
							enect size:	Aircraft noise
							11=1090	was associated
								iudamonts
								juugments Of
								auglity of life
								yuanty of me,
								well-being at
								auality

ROAD TRAFFIC NOISE EXPOSURE									
Cross-sectional Evidence									
See Stansfeld et									
al, Lancet, 2005									
above									
See Stansfeld,									
Hygge, Clark et									
al, Noise									
Health, 2010									
above									
See Matheson									
et al, Noise									
Health, 2010									
above									
See van									
Kempen et al,									
Enviro Health,									
2010 above									
See van									
Kempen et al,									
Enviro Res,									
2012 above									
RAILWAY NOISE EXPOSURE	RAILWAY NOISE EXPOSURE								
Cross-sectional Evidence									

12. Lercher et al,	Population:	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
Enviro and	school children,	not specified	Children	none	Attention – visual	No effect of noise	Findings:
Behav, 2003	total n=123,	whether noise	exposed to		search task;	on visual search	No adjustment
	aged 9-10yrs.	levels were	higher noise		Intentional,	performance	for age, gender,
	Selection: two	measured or	levels		explicit memory –	(attention).	parent's
	neighborhoods	modeled	compared to		reading a story	Children from	education,
	selected from	Noise source: rail	children		(Seyfried, 1998);	high noise group	housing
	larger sample	and road traffic	exposed to		Incidental	had poorer	characteristics
	based on noise	noise	lower levels		memory – free	results on explicit	etc reported in
	levels	Noise metrics: Ldn			recall;	and incidental	the paper.
	Cross-sectional	Noise groups:			Motivation –	memory tests.	
	study	noisy			solving insolvable	Type of analyses:	
		neighborhood			and solvable	Chi-square, t-test	
		(Ldn=62 dBA), and			puzzle (Evans et al,	Sample size	
		quiet			2001)	relating to the	
		neighborhood				effect size: n=123	
		(Ldn=46.1 dBA)					

	Reference	Population:generalpopulationsettings(hospitals,residences,publicvenues,educationalfacilities)+responserateandother	Exposure: exposure to high levels of environmental noise from various noise sources + noise metric involved + modelled or measured noise	Comparator: no noise exposure or lower levels of noise exposure	Confounding : adjusted for confounding	Outcome: assessment of outcome	Findings:expressedaseffectperdBifpossible.Type of analysesSamplesizerelatingtoeffectsize	Comments: Anything else to note
		selection /bias						
		factors Cross-sectional						
		or longitudinal						
AIRCRAFT N	NOISE EXPOSURE							
INTERVENT	ION EVIDENCE							
1.	Hyggo ot al	Donulation	Nuclear and a second se	· ·		• •		· ·
	nygge et al,	Population:	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
	Psychol Sci,	school children,	aircraft noise	comparison: children from	None	Outcomes: Reading test in	Findings: At the new	Comments: Findings:
	Psychol Sci, 2002	school children, noisy and quiet	aircraft noise levels measured	comparison: children from noisy schools	None	Outcomes: Reading test in German	At the new airport children	Comments: Findings: The effect of
	Psychol Sci, 2002	school children, noisy and quiet schools around	Noiseexposure:aircraftnoiselevelsmeasuredaroundschools	comparison: children from noisy schools around the	Contounding: None	Outcomes: Reading test in German (BigImaier,	At the new airport children showed a	Findings: The effect of noise on the
	Psychol Sci, 2002	school children, noisy and quiet schools around the old and the	Noiseexposure:aircraftnoiselevelsmeasuredaroundschoolsbeforeandafter	comparison: children from noisy schools around the old and the	Contounding: None	Outcomes: Reading test in German (BigImaier, 1969),	At the new airport children showed a decrease of the	Comments: Findings: The effect of noise on the reading tasks was
	Psychol Sci, 2002	school children, noisy and quiet schools around the old and the new airport,	aircraft noise levels measured around schools before and after relocation of the	comparison: children from noisy schools around the old and the new airport	None	Outcomes: Reading test in German (Biglmaier, 1969), Long-term	Findings:Attheairportchildrenshowedadecreaseofthethenumberof	Comments: Findings: The effect of noise on the reading tasks was not mediated by
	Psychol Sci, 2002	school children, noisy and quiet schools around the old and the new airport, total n=326,	Noise exposure: aircraft noise levels measured around schools before and after relocation of the airport;	comparison: children from noisy schools around the old and the new airport compared to	None	Outcomes: Reading test in German (BigImaier, 1969), Long-term memory – recall of	Findings:Atthenewairportchildrenshowedadecreaseofnumberofcorrectanswers	Comments:Findings:The effect ofnoise on thereading tasks wasnot mediated bymemory or
	Psychol Sci, 2002	school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs.	Noise exposure: aircraft noise levels measured around schools before and after relocation of the airport; Noise source:	comparison: children from noisy schools around the old and the new airport compared to children from	Contounding: None	Outcomes: Reading test in German (BigImaier, 1969), Long-term memory – recall of a text read in noisy	At the new airport children showed a decrease of the number of correct answers on long-term	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech
	Psychol Sci, 2002	school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups:	Noise exposure: aircraft noise levels measured around schools before and after relocation of the airport; Noise source: aircraft noise	comparison: children from noisy schools around the old and the new airport compared to children from quiet schools	Contounding: None	Outcomes:Reading testGerman(Biglmaier,1969),Long-termmemory – recall ofa text read in noisyconditionsthe	At the new airport children showed a decrease of the number of correct answers on long-term memory task,	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception.
	Psychol Sci, 2002	school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups: n=43 old-airport,	Noise exposure: aircraft noise levels measured around schools before and after relocation of the airport; Noise source: aircraft noise Noise metrics:	comparison: children from noisy schools around the old and the new airport compared to children from quiet schools around the	None	Outcomes: Reading test in German (Biglmaier, 1969), Long-term memory – recall of a text read in noisy conditions the previous day, Chart term	At the new airport children showed a decrease of the number of correct answers on long-term memory task, and impairment	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception. Poorer reading
	Psychol Sci, 2002	school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups: n=43 old-airport, no-noise; n=65	Noise exposure: aircraft noise levels measured around schools before and after relocation of the airport; Noise source: aircraft noise Noise metrics: Leq, 24h (dBA)	comparison: children from noisy schools around the old and the new airport compared to children from quiet schools around the old and the	None	Outcomes: Reading test in German (Biglmaier, 1969), Long-term memory – recall of a text read in noisy conditions the previous day, Short-term	At the new airport children showed a decrease of the number of correct answers on long-term memory task, and impairment of speech	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception. Poorer reading was not
	Psychol Sci, 2002	school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups: n=43 old-airport, no-noise; n=65 old-airport plus	Noise exposure: aircraft noise levels measured around schools before and after relocation of the airport; Noise source: aircraft noise Noise metrics: Leq, 24h (dBA)	Comparison: children from noisy schools around the old and the new airport compared to children from quiet schools around the old and the new airport	None	Outcomes:Reading testinGerman(BigImaier,1969),Long-termMemory – recall ofa text read in noisyconditionstheprevious day,Short-termMemory–reamong–	At the new airport children showed a decrease of the number of correct answers on long-term memory task, and impairment of speech perception.	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception. Poorer reading was not mediated by
	Psychol Sci, 2002	school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups: n=43 old-airport, no-noise; n=65 old-airport plus noise; n=107	Noise exposure: aircraft noise levels measured around schools before and after relocation of the airport; Noise source: aircraft noise Noise metrics: Leq, 24h (dBA)	Comparison: children from noisy schools around the old and the new airport compared to children from quiet schools around the old and the new airport	None	Outcomes:Reading testinGerman(Biglmaier,1969),Long-termmemory – recall ofa text read in noisyconditionstheprevious day,Short-termMemory–remembering–remembering–	At the new airport children showed a decrease of the number of correct answers on long-term memory task, and impairment of speech perception. At the old airport	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception. Poorer reading was not mediated by speech percention and
	Psychol Sci, 2002	school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups: n=43 old-airport, no-noise; n=65 old-airport plus noise; n=107 new-airport, no- noise; n=111	Noise exposure: aircraft noise levels measured around schools before and after relocation of the airport; Noise source: aircraft noise Noise metrics: Leq, 24h (dBA)	Comparison: children from noisy schools around the old and the new airport compared to children from quiet schools around the old and the new airport	None	Outcomes:Reading testReading testGerman(Biglmaier,1969),Long-termmemory – recall ofa text read in noisyconditionstheprevious day,Short-termmemorymemoryrememberingconsonants),Attention	At the new airport children showed a decrease of the number of correct answers on long-term memory task, and impairment of speech perception. At the old airport children showed	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception. Poorer reading was not mediated by speech perception, and impaired rocal
	Psychol Sci, 2002	school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups: n=43 old-airport, no-noise; n=65 old-airport plus noise; n=107 new-airport, no- noise; n=111	Noise exposure: aircraft noise levels measured around schools before and after relocation of the airport; Noise source: aircraft noise Noise metrics: Leq, 24h (dBA)	Comparison: children from noisy schools around the old and the new airport compared to children from quiet schools around the old and the new airport	None	Outcomes: Reading test in German (Biglmaier, 1969), Long-term memory – recall of a text read in noisy conditions the previous day, Short-term memory – remembering consonants), Attention – visual search and	At the new airport children showed a decrease of the number of correct answers on long-term memory task, and impairment of speech perception. At the old airport children showed decrease in the number of arrors	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception. Poorer reading was not mediated by speech perception, and impaired recall was in part
	Psychol Sci, 2002	school children, noisy and quiet schools around the old and the new airport, total n=326, aged 8-12yrs. Four groups: n=43 old-airport, no-noise; n=65 old-airport plus noise; n=107 new-airport, no- noise; n=111 new-airport plus	Noise exposure: aircraft noise levels measured around schools before and after relocation of the airport; Noise source: aircraft noise Noise metrics: Leq, 24h (dBA)	Comparison: children from noisy schools around the old and the new airport compared to children from quiet schools around the old and the new airport	None	Outcomes:Reading testReading testGerman(Biglmaier,1969),Long-termmemory – recall ofa text read in noisyconditionstheprevious day,Short-termmemorymemoryrememberingconsonants),Attention – visualsearchand	Findings:Atthenewairportchildrenshowedadecreaseofnumberofcorrectanswersonlong-termmemorytask,andimpairmentofspeechperception.At the old airportchildrenshoweddecreaseinnumberoferceseintheofofspeech	Comments: Findings: The effect of noise on the reading tasks was not mediated by memory or speech perception. Poorer reading was not mediated by speech perception, and impaired recall was in part

Table S4: Characteristics of included studies for environmental noise effects on attention

		Inclusion				tested in both	increase of the	reading.
		criteria:				quiet and noisy	number of	_
		2 years of				conditions,	correct answers	
		residence,				Speech perception	on short-term	
		speaking				 hearing a story 	memory task,	
		German fluently,				against noisy	and	
		normal hearing				background	improvement of	
		(assessed by				(adapted from	speech	
		audiometric				Hygge, Rönnberg,	perception.	
		screening)				Larsby, Arlinger,	Type of analyses:	
		Longitudinal				1992)	t-test for	
		study; baseline					independent	
		(wave 1): 6					samples,	
		months before					multivariate	
		the opening of					analyses of	
		new airport,					variance	
		follow-up 1 and					MANOVA	
		2 years (waves 2					Sample size	
		and 3) after					relating to the	
		changeover of					effect size:	
		airports					n=326	
		Intervention						
		Study						
Longitudina	al evidence	ſ	1		ſ	1	ſ	ſ
2.	Haines et al, Int	Population:	Noise exposure:	Comparison:	Confounding:	Outcome:	Findings:	Comments:
	J Epidemiol,	school children,	aircraft noise	children from	Age, household	Reading	Children from	At follow-up,
	2001	noisy and quiet	levels modelled	noisy schools	deprivation score	comprehension –	high- aircraft	reading
		schools around	around schools;	around	 incorporating 	Suffolk Reading	noise schools had	comprehension
		the airport, total	acute noise	compared to	income, home	Scale (SRS2) Level	poorer reading	was poorer
		n=275, aged 8-	exposure	children from	ownership,	2 and Level 3	comprehension	among children
		11yrs.	measured inside	quiet schools	unemployment,	(Hagley, 2002)	and poorer	from high-aircraft
		Sampling	classrooms		adapted from	Sustained	sustained	noise schools,
		procedure:	Noise source:		Townsend's Scale	Attention – score	attention.	but non-
		baseline sample	aircraft noise		(Townsend, et al,	task from Tests of	Type of analyses:	significant after
		tested in 1996:	Noise metrics:		1989), main	Everyday Attention	Analyses of	adjustment.
		n=340 children;	LAeq <i>,</i> 16h (dBA)		language spoken	tor Children (TEA-	covariance	This implies that

	follow-up sample tested in 1997: response rate 81%, n=275 Longitudinal study at two time points	Noise groups: High-aircraft noise-impact schools (Leq, 16h >66 dBA), low- aircraft noise- impact schools (Leq, 16h <57 dBA)		at home	Ch) (Manly et al, 1998)	ANCOVA Sample size relating to the effect size: n=148 from high- aircraft noise exposed schools, n=127 from low- aircraft noise	the effect of noise on reading comprehension may be influenced by socio- demographic factors.
See Hygge et al, Psychol Sci, 2002 above						exposed schools	
Cross-sectional evidence		1	1	1		1	1
3. Haines, Stansfeld, Brentnall et al, Psychol Med, 2001	Population: school children, 20 schools, total n=451, aged 8- 11yrs. Noisy and quiet schools matched for age, sex, other noise sources, noise protection at school, socio- economic status, main language; Response rate 82% Cross-sectional study	Noise exposure: aircraft noise levels modelled around schools Noise source: aircraft noise Noise metrics: LAeq, 16h (dBA) Noise groups: noisy schools (Leq, 16h >63 dBA), quiet schools (Leq, 16h <57 dBA)	Comparator : Children from high aircraft noise schools compared with children from lower aircraft noise level schools	Confounding: Household deprivation score – incorporating income, home tenure, car ownership, employment, central heating, social class and household crowding (Townsend, et al, 1989), age, main language spoken at home	Outcome:ReadingcomprehensionSuffolkReadingScale(SRS2)Level2 (Hagley, 2002);Long-termmemory-includingimmediaterecall,delayedrecall, andrecognition-adaptedfromChildMemoryScale(Cohen,1997);BackwardBackwardserialdigitrecall(PickeringandGathercole, 2000);Sustained	Findings: Children in high noise schools had poor performance on the difficult items (20% of all items) of the reading scale. Type of analyses: Analysis of covariance (ANCOVA), Multilevel modeling analysis Sample size relating to the effect size: n=451 (n=236 from high-level noise schools. n=215	Comments: Findings: No difference in reading, immediate recall, delayed recall, recognition memory, sustained attention and serial backward digit recall between children from high-level aircraft noise schools and children from low level noise schools.

						task from Tests of	noise schools)	
						Everyday Attention		
						for Childron (TEA		
						Ch) (Manhy at al		
						Ch) (Maniy et al,		
						1998)		
4.	Stansfeld et al,	Population:	Noise exposure:	Comparator:	Confounding	Outcome:	Findings:	Comments:
	Lancet, 2005	school children,	aircraft noise	lower levels	age, gender,	Reading	Increase of	Findings:
		89 schools	levels at home and	of noise	parental	comprehension	aircraft noise at	No association
		around three	at school	exposure	employment,	Suffolk Reading	school by 1 dBA	between aircraft
		airports, total	measured in an		home ownership,	Scale Level 2	correlated to	and road traffic
		n=2844, aged 9-	area from 7 am to		home crowding,	(SRS2) (Hagley,	decrease of the	noise and cued
		13yrs.	11 pm; road traffic		mother's	2002), CITO	performance on	conceptual recall,
		Cross sectional	noise at school		educational	Readibility Index	the reading test	cued information
		study	modelled or		attainment,	for elementary and	by	recall,
			combination of		long-standing	Special Education	0.008 marks;	prospective
			measurements		illness. main	(Staphorsius.	Increase of	memory, working
			with models		language spoken	1994). Ecaluacion	aircraft noise at	memory, and
			Noise source		at home parental	Comprension	school by 1 dBA	sustained
			aircraft and road		support for school	Lectora ECL-2 (De	correlated to	attention
			traffic		work classroom		decrease of the	attention.
			Noiso motrics:		alazing	Enisodic momory	norformanco on	
			Noise metrics.		giazing	Child Momory	the recognition	
			LACH, ION (UBA)			- Child Memory	the recognition	
						scale, (Conen,	test by 0.018	
						1997); Sustained	marks.	
						attention –	Increase of road	
						Toulouse Pieron	traffic noise by 1	
						test (Toulouse et	dB was	
						al, 1986);	associated with	
						Working memory	an increase of	
						– Search and	information	
						Memory test	recall by 0.038	
						(Smith and Miles,	marks and an	
						1987; Hygge et al,	increase of	
						2003);	conceptual recall	
						Prospective	by 0.013 marks.	
						memory (writing	Type of analyses:	

						initials as	Multilevel model	
						instructed)	analyses (for data	
							clustering)	
							Sample size	
							relating to the	
							effect size: range	
							from 1939 to	
							2014 with	
							complete data	
5.	Stansfeld,	Population:	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
	Hygge, Clark et	school children,	aircraft noise	Munich	Munich study:	Munich study:	Munich study:	Findings:
	al, Noise	two studies re-	levels measured	study:	self-reported	Reading test in	No association	RANCH study:
	Health, 2010	analysed.	around schools in	children from	sleep quality;	German	between	Daytime and
		Munich study:	Munich study;	noisy schools	RANCH study:	(Biglmaier,	nighttime	nighttime noise
		n=326, aged 9-	modeled in	around the	daytime aircraft	1969) in noisy	aircraft noise and	exposure highly
		11yrs, around	RANCH study	old and the	noise at school,	conditions (80	cognitive	correlated.
		old and new	Noise source:	new airport	road-traffic noise,	dBA)	impairment	Nighttime aircraft
		airport	aircraft noise	compared to	sleep problems,	Long-term	(mediated by	exposure was no
		Inclusion criteria:	Noise metrics:	children from	age, sex, parental	memory – recall of	sleep quality).	longer associated
		2 years of	Munich study: Leq,	quiet schools	employment,	a text read in noisy	RANCH study:	with impaired
		residence,	24h (dBA);	around the	crowding,	conditions the	Increase of	reading
		speaking	RANCH study: Leq,	old and the	homeownership,	previous day.	nighttime	comprehension
		German fluently	nighttime at home	new airport.	mother's	RANCH study:	aircraft noise at	and recognition
		Longitudinal	(dBA) (11 p.m. to 7	RANCH study:	education, child's	Reading	home by 1 dBA	memory after
		study; baseline	a.m.)	higher levels	illness, main	comprehension	correlated to	adjustment for
		(wave 1): 6		of aircraft	language at home,	Suffolk Reading	decrease of the	daytime aircraft
		months before		noise	parental support	Scale Level 2	reading test	noise at school.
		the opening of		exposure	for home work,	(SRS2) (Hagley,	performance by	
		new airport,		compared to	classroom glazing	2002),	0.009 marks, and	
		follow-up 1 and		lower levels		Episodic memory	to decrease of	
		2 years (waves 2		of noise		– Child Memory	recognition	
		and 3) after				Scale, (Cohen,	memory by 0.031	
		changeover of				1997); Sustained	marks.	
		airports				attention –	Type of analyses:	
		RANCH study:				Toulouse Pieron	Multilevel	
		n=857, aged 9-				test (Toulouse et	modeling	

	10yrs, around the airport Cross-sectional study				al, 1986); Working memory – Search and Memory test (Smith and Miles, 1987; Hygge et al, 2003)	Sample size relating to the effect size: n=326 (Munich study), n=842 for RANCH study	
6. Cohen et I, J Person Social Psychol, 1981 Cohen et al, American Scientist, 1981.	Population: school children, noisy and quiet schools around the airport, first testing n=262, second testing n=163, age unknown (third and fourth grade, possibly 9-10yrs) Sampling procedure: Noisy and quiet schools matched for age, grade, ethnic and racial distribution, families with	Noise exposure: aircraft noise levels measured inside the classroom for 1 hour in the morning and in the afternoon Noise source: aircraft noise Noise metrics: peak level, L33, LAeq 1h (dBA)	Comparator: Children from noisy classrooms compared to children from noise-abated classrooms and to children from quiet schools. Longitudinal analyses of children who moved from noisy to noise-abated classroom in contrast to children who	Confounding: Number of children in the family, grade in school, months enrolled in school, race, cognitive aptitude test, performance under ambient conditions	Outcome: California Test of Basic Skills – reading and mathematics tests (California Assessment Program, 1976) Auditory discrimination test – ability to discriminate between pairs of words (Wepman, 1958) Distractibility test – a crossing out Es test under ambient and distracting conditions (Cohen	Findings: Longitudinal testing: children from noisy schools were less distractible; more often failed solving the puzzles, solved puzzles for longer time; and had higher levels of noise perception than children in quiet schools. Cross-sectional: children from noisy classrooms more often failed the puzzle test in	Comments: Findings: No effect of noise on reading achievement or auditory discrimination between classrooms. No impact of noise on distraction between noisy, abated and quiet classrooms.

		parental		noisy rooms.		Helplessness –	children from	
		educational and				tested by speed of	noise-abated and	
		occupational				solving a solvable	quiet rooms.	
		level				puzzle after trying	Type of analyses:	
		Exclusion				to solve an	Regression	
		criterion:				unsolvable puzzle	analyses	
		hearing				Perception of	Sample size	
		impairment				noise –	relating to the	
		(audiometric				questionnaire for	effect size:	
		screening)				children	n=163 for	
		Longitudinal					longitudinal	
		study; follow-up					analysis, i.e. n=83	
		period: 1 year					from noisy	
		(1977-1978)					schools and n=80	
		Cross-sectional					from quiet	
		study:					schools	
		comparison					n=262 for cross-	
		between noisy,					sectional	
		noise-abated					analvsis. i.e. n=97	
		and guiet					from noisy, n=45	
		classrooms					from noise-	
							abated, and	
							n=120 from quiet	
							classrooms	
7.	Cohen et al,							
	American							
	Scientist, 1981,							
	see Cohen et al							
	above.							
8.	Matsui et al,	Population:	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Findings:
	Noise Health,	school children,	aircraft noise	children from	Age, sex, schools,	Reading	Aircraft noise	No association
	2004	high aircraft	levels at home and	homes with	household	comprehension	levels at home	between aircraft
		noise exposure	at school	low noise	deprivation score	Suffolk Reading	significantly	noise levels at
		at school, three	modelled	levels (LAeq,	(including income,	Scale Level 2	predict poor	home and
		groups of aircraft	Noise source:	16h < 63 dB)	home tenure, car	(Hagley, 1987);	performance at	delayed
		noise exposure	aircraft noise	compared to	ownership,	Long term	immediate recall	recognition,

		at home; total n=451, aged 8- 9yrs, response rate: 83% in high	Noise metrics: LAeq, 16h (dB) Noise groups: All children attending	children from schools with higher noise levels (LAeq,	employment, central heating, household crowding, social	Memory Recall and Recognition – tested with Children's Memory	and delayed recall tests. Type of analyses: Multiple logistic	sustained attention and reading comprehension.
		noise schools	schools with high	16h =63-66	class), mother's	scale (Cohen,	regression	
		and 81% in low		dB), and to	long standing	1997); Sustained	Samplo sizo	
		Cross sectional	63 dB) but with	noise levels	illness main	Attention tested	relating to the	
		study	different levels of	(LAeg. 16h >	language spoken	with Tests of	effect size:	
		,	aircraft noise at	63 dB)	at home	Everyday Attention	n=163 with	
			home (LAeq, 16h <	,		for Children (TEA-	complete data	
			63dB vs. LAeq, 16h			Ch) (Manly et al,		
			=63-66 dB, vs.			1998)		
			LAeq, 16h > 63 dB)		-			
9.	Van Kempen et	Population:	Noise exposure:	Compared to:	Confounding:	Outcome:	Findings:	Comments:
	al, Enviro	school children	home and school	lower levels	Age, gender, main		Positive and	Findings:
	Health, 2010	from 24 schools	addresses for each	of noise	language spoken	Neurobehavioral	significant	Significant
		around	children linked to	exposure	at nome, long-	evaluation system	relation between	correlation
		Amsterdam	modelled noise		standing liness,	(NES) tests (Letz,	aircraft noise	between aircraft
		airport, 620	Noise source:		for school work	1001): Simple	exposure at	and road traffic
		approached	noise source.		school glazing	Tost Switching	school and the	No relation
		total sample	traffic		socio-economic	Attention Test	on Switching	hetween aircraft
		n=553, aged 9-	Noise metrics:		status (crowding.	Hand-Eve-	Attention test	noise exposure at
		11yrs	LAeg 7-23h (dBA)		home ownership,	Coordination Test,	(SAT).	school and other
		Cross-sectional	for aircraft noise;		parental	Symbol-Digit	Positive and	NES tests; no
		study	LAeq 7-23h (dBA)		employment,	Substitution Test,	significant	relation between
			for road traffic		mother's	Digit Memory Span	relation between	aircraft noise
			noise		education), the	Test.	road traffic noise	exposure at
					other noise source	2) Other cognitive	at school and the	home and
						outcomes:	number of errors	cognitive
						Reading	on SAT test	outcomes.
						comprehension	Type of analyses:	No relation
						(CRIE test,	multilevel model	between road
						Staphorsius, 1994);	analyses by	traffic noise
		1				Prospective	IVIIXED procedure	exposure at

						memory (writing initials where instructed);	Sample size relating to the effect size: n=433	home and cognitive outcomes.
						(Child Memory scale, Cohen,	complete data	
						memory (Search and Memory test,		
						Sustained attention		
						test, Toulouse et al, 1986)		
10.	Van Kempen et	Population:	Noise exposure:	Compared to:	Confounding:	Outcomes:	Findings:	Comments:
	al, Enviro Res,	school children	nome and school	lower levels	Modelled	Neurobenavioral	Positive and	Findings:
	2012	around	childron linked to	ov nosuro	NO2 (ug/m2) and	(NES) tosts (Lotz	relation between	correlation
		Amsterdam	modelled noise	exposure	noz (µg/115) anu	(1001) Simple	read traffic poise	between aircraft
		airport 620	levels			Reaction Time	at school and the	and road traffic
		children	Noise source:		Age. gender. main	Test. Switching	number of errors	noise levels at
		approached,	aircraft and road		language spoken	Attention Test,	on SAT test;	home and school;
		total sample	traffic		at home, long-	Hand-Eye-	Positive and	positive
		n=553, aged 9-	Noise metrics:		standing illness,	Coordination Test,	significant	correlation
		11yrs	LAeq 7-23h (dBA)		parental support	Symbol-Digit	relation between	between NO2
		Cross-sectional	for aircraft noise;		for school work,	Substitution Test,	aircraft noise at	and PM10 at
		study	LAeq 7-23h (dBA)		school glazing,	Digit Memory Span	school and the	home and school.
			for road traffic		socio-economic	Test.	number of errors	NO2 level at
			noise		status (crowding,		on SAT test; both	school
					nome ownership,		adjustment for	significantly
					employment		NO2	snan length
					mother's		concentration at	measured with
					education)		school.	DMST.
					,		Type of analyses:	No relation

							multilevel model analyses by MIXED procedure Sample size relating to the effect size: n=485 children with complete data	between aircraft and road traffic noise exposure at home and cognitive outcomes. Combined exposure to NO2 and road traffic noise had effect on reaction times measured with SRTT and the number of errors on SAT.
ROAD TRA	FFIC NOISE EXPOSU	JRE						
Cross-secti	onal Evidence	1		1	1		1	
	See Van Kempen et al, Enviro Health, 2010 above							
	Kempen et al, Enviro Res, 2012 above							
	See Stansfeld et al, Lancet, 2005 above							
11.	Sanz et al, Int Arch Enviro Health, 1993	Population: school children, two schools of similar socio- economic characteristics, total n=136,	Noise exposure: ambient noise levels measured outside and inside schools (classroom with closed windows)	Comparison: Children from a high-noise school compared to children from a low-noise	Confounding: None	Outcomes:AttentionDifferencePerceptionTest("facetest")(TecnicosExpecialistesAssociadosAssociados	Findings: No difference between schools on the "face test". Third-grade pupils from a high-noise school	Comments: Findings: No adjustment for age, gender, etc reported in the paper.

study Noise metrics: out letters from a Type of analyses:	
LAeq (dBA) text ("text test") Chi-square, t-test	
Noise groups: low- Sample size	
noise school relating to the	
(mean=54.4 dBA) effect size: n=136	
vs. high-noise	
school (mean=57.9	
dBA)	
12. Cohen et al, J Population: Noise exposure: Comparator: Confounding: Outcome: Findings: Comme	nts:
Experim Soc school children, noise levels were Children who Audiometric Auditory Children living in Method	5:
Psychol, 1973 total n=54, 2 nd , measured outside lived in noisy testing, parent's discrimination – noisy Floor la	vel as a
3^{rd} , 4^{th} and 5^{th} the buildings, buildings ≥ 4 educational level, measured by apartments ≥ 4 surroga	e of
grade (age not inside the years were floor level, length Auditory years had noise ex	oosure.
specified); buildings compared to of residence, Discrimination test positive Finding	:
Sampling (hallways), and children who school grade, (Wepman, 1958); correlation Duratio	of
procedure: 73 inside of the lived in noisy number of Reading – between residen	e is
children apartments (living buildings ≤ 3 children in family including word auditory related	to
approached, room) years vocabulary, discrimination impairn	ent in
exclusion Noise source: road reading and reading test, auditor	
criteria: poor traffic comprehension positive discrimination	nation.
knowledge of Noise metrics: not and reading total correlation Floor	level
English, not specified (dBA) tested by the between floor account	for the
living at the Noise groups: Metropolitan level and variance	OT
building of children who lived Achievement auditory auditory	
Interest, in the hoisy Reading lest discrimination discrimination	hation.
absence, buildings 24 years, (Durost et al, (adjustment for Auditor	ation
disturbance on children who lived [1971]; parent's discrimination of the second s	idtion mother's
testing day, in horsy buildings s Stroop Color-word Education); and	nothers
liearing denot at 5 years leducation liearing de	for the
Cross sectional between floor total v	rianco in
study	
allu Teauling test Teauling	ເບລເ
adjustment for Conclus	on.
adjustment for Conclus	of noise

							education).	exposure in
							Type of analyses:	reading
							Correlation,	impairment is
							partial	indirect (through
							correlation,	auditory
							stepwise	discrimination).
							regression	
							analysis	
							Sample size	
							relating to the	
							effect size:	
							n=54 (n=34 living	
							≥4 years, n=20	
							living ≤ 3 years in	
							noisy buildings)	
RAILWAY N	NOISE EXPOSURE							
Cross-section	onal Evidence							
13.	Lercher et al,	Population:	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
13.	Lercher et al, Enviro and	Population: school children,	Noise exposure: not specified	Comparison: Children	Confounding: none	Outcomes: Attention – visual	Findings: No effect of noise	Comments: Findings:
13.	Lercher et al, Enviro and Behav, 2003	Population:schoolchildren,totaln=123,	Noise exposure: not specified whether noise	Comparison: Children exposed to	Confounding: none	Outcomes: Attention – visual search task;	Findings: No effect of noise on visual search	Comments: Findings: No adjustment
13.	Lercher et al, Enviro and Behav, 2003	Population:schoolchildren,totaln=123,aged 9-10yrs.	Noiseexposure:notspecifiedwhethernoiselevelswere	Comparison: Children exposed to higher noise	Confounding: none	Outcomes: Attention – visual search task; Intentional,	Findings: No effect of noise on visual search performance	Comments: Findings: No adjustment for age, gender,
13.	Lercher et al, Enviro and Behav, 2003	Population: school children, total n=123, aged 9-10yrs. Selection: two	Noiseexposure:notspecifiedwhethernoiselevelsweremeasuredor	Comparison: Children exposed to higher noise levels	Confounding: none	Outcomes: Attention – visual search task; Intentional, explicit memory –	Findings: No effect of noise on visual search performance (attention).	Comments: Findings: No adjustment for age, gender, parent's
13.	Lercher et al, Enviro and Behav, 2003	Population:schoolchildren,totaln=123,aged 9-10yrs.Selection:twoneighborhoods	Noiseexposure:notspecifiedwhethernoiselevelsweremeasuredormodeled	Comparison: Children exposed to higher noise levels compared to	Confounding: none	Outcomes: Attention – visual search task; Intentional, explicit memory – reading a story	Findings: No effect of noise on visual search performance (attention). Children from	Comments: Findings: No adjustment for age, gender, parent's education,
13.	Lercher et al, Enviro and Behav, 2003	Population:schoolchildren,totaln=123,aged 9-10yrs.Selection:Selection:twoneighborhoodsselectedselectedfrom	Noiseexposure:notspecifiedwhethernoiselevelsweremeasuredormodeledNoiseNoisesource:rail	Comparison: Children exposed to higher noise levels compared to children	Confounding: none	Outcomes: Attention – visual search task; Intentional, explicit memory – reading a story (Seyfried, 1998);	Findings: No effect of noise on visual search performance (attention). Children from high noise group	Comments: Findings: No adjustment for age, gender, parent's education, housing
13.	Lercher et al, Enviro and Behav, 2003	Population:schoolchildren,totaln=123,aged 9-10yrs.Selection:twoneighborhoodsselectedfromlargersample	Noiseexposure:notspecifiedwhethernoiselevelsweremeasuredormodeledNoise source:Noiseroadtraffic	Comparison: Children exposed to higher noise levels compared to children exposed to	Confounding: none	Outcomes: Attention – visual search task; Intentional, explicit memory – reading a story (Seyfried, 1998); Incidental	Findings: No effect of noise on visual search performance (attention). Children from high noise group had poorer	Comments: Findings: No adjustment for age, gender, parent's education, housing characteristics
13.	Lercher et al, Enviro and Behav, 2003	Population:school children,total n=123,aged 9-10yrs.Selection:twoneighborhoodsselected fromlarger samplebased on noise	Noise exposure: not specified whether noise levels were measured or modeled Noise source: rail and road traffic noise	Comparison: Children exposed to higher noise levels compared to children exposed to lower levels	Confounding: none	Outcomes: Attention – visual search task; Intentional, explicit memory – reading a story (Seyfried, 1998); Incidental memory – free	Findings: No effect of noise on visual search performance (attention). Children from high noise group had poorer results on explicit	Comments: Findings: No adjustment for age, gender, parent's education, housing characteristics etc reported in
13.	Lercher et al, Enviro and Behav, 2003	Population: school children, total n=123, aged 9-10yrs. Selection: two neighborhoods selected from larger sample based on noise levels	Noiseexposure:notspecifiedwhethernoiselevelsweremeasuredormodeledNoise source:Noisesource:noiseNoise metrics:	Comparison: Children exposed to higher noise levels compared to children exposed to lower levels	Confounding: none	Outcomes: Attention – visual search task; Intentional, explicit memory – reading a story (Seyfried, 1998); Incidental memory – free recall;	Findings: No effect of noise on visual search performance (attention). Children from high noise group had poorer results on explicit and incidental	Comments: Findings: No adjustment for age, gender, parent's education, housing characteristics etc reported in the paper.
13.	Lercher et al, Enviro and Behav, 2003	Population:schoolchildren,totaln=123,aged 9-10yrs.Selection:twoneighborhoodsselectedfromlargersamplebasedonlevelsCross-sectional	Noiseexposure:notspecifiedwhethernoiselevelsweremeasuredormodeledmodeledNoisesource:noiseNoiseNoisemetrics:LdnNoise groups:	Comparison: Children exposed to higher noise levels compared to children exposed to lower levels	Confounding: none	Outcomes: Attention – visual search task; Intentional, explicit memory – reading a story (Seyfried, 1998); Incidental memory – free recall; Motivation –	Findings: No effect of noise on visual search performance (attention). Children from high noise group had poorer results on explicit and incidental memory tests.	Comments: Findings: No adjustment for age, gender, parent's education, housing characteristics etc reported in the paper.
13.	Lercher et al, Enviro and Behav, 2003	Population: school children, total n=123, aged 9-10yrs. Selection: two neighborhoods selected from larger sample based on noise levels Cross-sectional study	Noiseexposure:notspecifiedwhethernoiselevelsweremeasuredormodeledmodeledNoisesource:noisenoiseNoisemetrics:LdnNoisenoisegroups:noisynoisy	Comparison: Children exposed to higher noise levels compared to children exposed to lower levels	Confounding: none	Outcomes: Attention – visual search task; Intentional, explicit memory – reading a story (Seyfried, 1998); Incidental memory – free recall; Motivation – solving insolvable	Findings: No effect of noise on visual search performance (attention). Children from high noise group had poorer results on explicit and incidental memory tests. Type of analyses:	Comments: Findings: No adjustment for age, gender, parent's education, housing characteristics etc reported in the paper.
13.	Lercher et al, Enviro and Behav, 2003	Population: school children, total n=123, aged 9-10yrs. Selection: two neighborhoods selected from larger sample based on noise levels Cross-sectional study	Noiseexposure:notspecifiedwhethernoiselevelsweremeasuredormodelednoiseNoise source:railandroadtrafficnoiseNoise metrics:Noise groups:noisyneighborhoodNoise	Comparison: Children exposed to higher noise levels compared to children exposed to lower levels	Confounding: none	Outcomes: Attention – visual search task; Intentional, explicit memory – reading a story (Seyfried, 1998); Incidental memory – free recall; Motivation – solving insolvable and solvable	Findings: No effect of noise on visual search performance (attention). Children from high noise group had poorer results on explicit and incidental memory tests. Type of analyses: Chi-square, t-test	Comments: Findings: No adjustment for age, gender, parent's education, housing characteristics etc reported in the paper.
13.	Lercher et al, Enviro and Behav, 2003	Population:school children,total n=123,aged 9-10yrs.Selection:twoneighborhoodsselected fromlarger samplebased on noiselevelsCross-sectionalstudy	Noiseexposure:notspecifiedwhethernoiselevelsweremeasuredormodeledmodeledNoisesource:noisenoiseNoisemetrics:LdnNoisenoisyneighborhood(Ldn=62 dBA), and	Comparison: Children exposed to higher noise levels compared to children exposed to lower levels	Confounding: none	Outcomes: Attention – visual search task; Intentional, explicit memory – reading a story (Seyfried, 1998); Incidental memory – free recall; Motivation – solving insolvable and solvable puzzle (Evans et al,	Findings:No effect of noiseon visual searchperformance(attention).Children fromhigh noise grouphad poorerresults on explicitand incidentalmemory tests.Type of analyses:Chi-square, t-testSample size	Comments: Findings: No adjustment for age, gender, parent's education, housing characteristics etc reported in the paper.
13.	Lercher et al, Enviro and Behav, 2003	Population: school children, total n=123, aged 9-10yrs. Selection: two neighborhoods selected from larger sample based on noise levels Cross-sectional study	Noise exposure: not specified whether noise levels were measured or modeled Noise source: rail and road traffic noise Noise metrics: Ldn Noise groups: noisy neighborhood (Ldn=62 dBA), and quiet	Comparison: Children exposed to higher noise levels compared to children exposed to lower levels	Confounding: none	Outcomes: Attention – visual search task; Intentional, explicit memory – reading a story (Seyfried, 1998); Incidental memory – free recall; Motivation – solving insolvable and solvable puzzle (Evans et al, 2001)	Findings: No effect of noise on visual search performance (attention). Children from high noise group had poorer results on explicit and incidental memory tests. Type of analyses: Chi-square, t-test Sample size relating to the	Comments: Findings: No adjustment for age, gender, parent's education, housing characteristics etc reported in the paper.
13.	Lercher et al, Enviro and Behav, 2003	Population: school children, total n=123, aged 9-10yrs. Selection: two neighborhoods selected from larger sample based on noise levels Cross-sectional study	Noiseexposure:notspecifiedwhethernoiselevelsweremeasuredormodeledmodeledNoise source:railandroadtrafficnoisenoiseNoise groups:noisyneighborhood(Ldn=62 dBA), andquietneighborhood	Comparison: Children exposed to higher noise levels compared to children exposed to lower levels	Confounding: none	Outcomes: Attention – visual search task; Intentional, explicit memory – reading a story (Seyfried, 1998); Incidental memory – free recall; Motivation – solving insolvable and solvable puzzle (Evans et al, 2001)	Findings: No effect of noise on visual search performance (attention). Children from high noise group had poorer results on explicit and incidental memory tests. Type of analyses: Chi-square, t-test Sample size relating to the effect size: n=123	Comments: Findings: No adjustment for age, gender, parent's education, housing characteristics etc reported in the paper.

Table S5: Characteristics of included studies for environmental noise effects on executive function deficit (working memory)

	Reference	Population:	Exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
		general	exposure to high	no noise	adjusted for	assessment of	expressed as	Anything else to
		population in	levels of	exposure or	confounding	outcome	effect per dB if	note
		settings	environmental	lower levels			possible.	
		(hospitals,	noise from various	of noise				
		residences,	noise sources	exposure			Type of analyses	
		public venues,	+ noise metric					
		educational	involved +				Sample size	
		facilities) +	modelled or				relating to the	
		response rate	measured noise				effect size	
		and other						
		selection /bias						
		factors						
		Cross-sectional						
		or longitudinal						
AIRCRAFT	NOISE EXPOSURE							
CROSS-SEC	TIONAL EVIDENCE							
1.	Haines,	Population:	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	Stansfeld,	school children,	aircraft noise	Children from	Household	Reading	Children in high	Findings:
	Brentnall et al,	20 schools, total	levels modelled	high aircraft	deprivation score	comprehension –	noise schools had	No difference in
	Psychol Med,	n=451, aged 8-	around schools	noise schools	 incorporating 	Suffolk Reading	poor	reading,
	2001	11yrs. Noisy and	Noise source:	compared	income, home	Scale (SRS2) Level	performance on	immediate recall,
		quiet schools	aircraft noise	with children	tenure, car	2 (Hagley, 2002);	the difficult items	delayed recall,
		matched for age,	Noise metrics:	from lower	ownership,	Long-term	(20% of all items)	recognition
		sex, other noise	LAeq, 16h (dBA)	aircraft noise	employment,	memory –	of the reading	memory,
		sources, noise	Noise groups:	level schools	central heating,	including	scale.	sustained
		protection at	noisy schools (Leq,		social class and	immediate recall,	Type of analyses:	attention and
		school, socio-	16h >63 dBA),		household	delayed recall, and	Analysis of	serial backward
		economic status,	quiet schools (Leq,		crowding	recognition –	covariance	digit recall
		main language;	16h <57 dBA)		(Townsend, et al,	adapted from	(ANCOVA),	between children
		Response rate			1989), age, main	Child Memory	Multilevel	from high-level
		82%			language spoken	Scale (Cohen,	modeling analysis	aircraft noise
		Cross-sectional			at home	1997);	Sample size	schools and
		study				Backward serial	relating to the	children from low
						digit recall	effect size: n=451	level noise
						(Pickering and	(n=236 from	schools.

						Gathercole 2000)	high-level noise	
						Sustained	schools n-215	
						Attention - score	from low-level	
						task from Tests of	noise schools)	
						Everyday Attention		
						for Children (TEA		
						Ch) (Manly et al		
						1998)		
2	Haines	Population [.]	Noise exposure	Comparator [.]	Confounding	Outcome [.]	Findings	Comments:
2.	Stansfeld Joh	school children	aircraft noise	Children from	Household	Reading	Children in high	Findings
	et al Psychol	8 schools total		high aircraft	deprivation score	comprehension -	noise schools had	Acute aircraft
	Med 2001	n=3/0 area 8	around schools:	noise schools		Suffolk Reading	noor	noise exposure at
	Wieu, 2001	11-340, ageu o	around schools,	compared	income crowding	Scale (SPS2) Level	pool	the time of
		auist schools	acute noise levels	compareu	homo ownorship	2 (Hardow 2002)	the reading coole	the time of
		quiet schools	Neise	from lower	unomployment	Z (Hagley, 2002),	the reduing scale	testing was not
		matcheu for age,	noise source.	nom lower	(Townsond of al	Long-term	from low noise	associated with
		sex, other noise			(TOWNSEND, et al,	including –	cohoola (over	reauing
		sources, noise	Noise metrics:	level schools	1989), age, main	including	schools (even	comprehension
		protection at	LAeq, 16n (dBA)		language spoken	recognition task	after adjustment	or annoyance.
		school, socio-	outdoors; single		at nome	and recall task	for deprivation,	
		economic status,	event noise			(Evans et al, 1995);	age, language).	The association
		ethnic groups;	exposure level (SEL			Working memory	Children in high	between aircraft
		Response rate	dBA); LAeq during			– serial digit recall	noise schools had	noise exposure
		77%	time needed for			task;	poor long-term	and reading
		Cross-sectional	task completion			Motivation –	memory than	comprehension is
		study	Noise groups:			performance	children from low	independent
			noisy schools (Leq,			measure, i.e.	noise schools	from noise
			16h >66 dBA),			solving insolvable	(only a	annoyance, acute
			quiet schools (Leq,			and solvable	subsample	noise levels, age,
			16h <57 dBA)			puzzle (Evans et al,	without bias).	language, and
						1995);	No effect of noise	deprivation.
						Child Attributional	exposure on	
						Style – measured	motivation, self-	
						by Child	reported	
						Attribution Style	attributional	
						Questionnaire	scale and	
						(CASQ; Kaslow &	classroom	
						Nolen-Hoeksema,	motivation.	
						1991);	Type of analyses:	
						Classroom	Analysis of	

						motivation. i.e.	covariance	
						learned	(ANCOVA)	
						helplessness –	Sample size	
						estimated by	relating to the	
						teachers using	effect size: n=340	
						Student Behaviour	(n=169 from	
						Checklist (SBC:	high-level noise	
						Fincham et	schools. n=171	
						al. 1989)	from low-level	
						,	noise schools)	
3.	Stansfeld et al,	Population:	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	Lancet, 2005	school children,	aircraft noise	lower levels	age, gender,	Reading	Increase of	Findings:
		89 schools	levels at home and	of noise	parental	comprehension	aircraft noise at	No association
		around three	at school	exposure	employment,	Suffolk Reading	school by 1 dBA	between aircraft
		airports, total	measured in an		home ownership,	Scale Level 2	correlated to	and road traffic
		n=2844, aged 9-	area from 7 am to		home crowding,	(SRS2) (Hagley,	decrease of the	noise and cued
		13yrs.	11 pm; road traffic		mother's	2002), CITO	performance on	conceptual recall,
		Cross sectional	noise at school		educational	Readibility Index	the reading test	cued information
		study	modelled or		attainment,	for elementary and	by	recall,
			combination of		long-standing	Special Education	0.008 marks;	prospective
			measurements		illness, main	(Staphorsius,	Increase of	memory, working
			with models		language spoken	1994), Ecaluacion	aircraft noise at	memory, and
			Noise source:		at home, parental	Comprension	school by 1 dBA	sustained
			aircraft and road		support for school	Lectora ECL-2 (De	correlated to	attention.
			traffic		work, classroom	La Cruz, 1999);	decrease of the	
			Noise metrics:		glazing	Episodic memory	performance on	
			LAeq, 16h (dBA)			 Child Memory 	the recognition	
						scale, (Cohen,	test by 0.018	
						1997); Sustained	marks.	
						attention –	Increase of road	
						Toulouse Pieron	traffic noise by 1	
						test (Toulouse et	dB was	
						al, 1986);	associated with	
						Working memory	an increase of	
						– Search and	information	
						Memory test	recall by 0.038	
						(Smith and Miles,	marks and an	
						1987; Hygge et al,	increase of	
						2003);	conceptual recall	

						Prospective	by 0.013 marks.	
						memory (writing	Type of analyses:	
						initials as	Multilevel model	
						instructed)	analyses (for data	
							clustering)	
							Sample size	
							relating to the	
							effect size: range	
							from 1939 to	
							2014 with	
							complete data	
4.	Stansfeld,	Population:	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
	Hygge, Clark et	school children,	aircraft noise	Munich	Munich study:	Munich study:	Munich study:	Findings:
	al, Noise	two studies re-	levels measured	study:	self-reported	Reading test in	No association	RANCH study:
	Health, 2010	analysed.	around schools in	children from	sleep quality;	German	between	Daytime and
		Munich study:	Munich study;	noisy schools	RANCH study:	(Biglmaier,	nighttime	nighttime noise
		n=326, aged 9-	modeled in	around the	daytime aircraft	1969) in noisy	aircraft noise and	exposure highly
		11yrs, around	RANCH study	old and the	noise at school,	conditions (80	cognitive	correlated.
		old and new	Noise source:	new airport	road-traffic noise,	dBA)	impairment	Nighttime aircraft
		airport	aircraft noise	compared to	sleep problems,	Long-term	(mediated by	exposure was no
		Inclusion criteria:	Noise metrics:	children from	age, sex, parental	memory – recall of	sleep quality).	longer associated
		2 years of	Munich study: Leq,	quiet schools	employment,	a text read in noisy	RANCH study:	with impaired
		residence,	24h (dBA);	around the	crowding,	conditions the	Increase of	reading
		speaking	RANCH study: Leq,	old and the	homeownership,	previous day.	nighttime	comprehension
		German fluently	nighttime at home	new airport.	mother's	RANCH study:	aircraft noise at	and recognition
		Longitudinal	(dBA) (11 p.m. to 7	RANCH study:	education, child's	Reading	home by 1 dBA	memory after
		study; baseline	a.m.)	higher levels	illness, main	comprehension	correlated to	adjustment for
		(wave 1): 6		of aircraft	language at home,	Suffolk Reading	decrease of the	daytime aircraft
		months before		noise	parental support	Scale Level 2	reading test	noise at school.
		the opening of		exposure	for home work,	(SRS2) (Hagley,	performance by	
		new airport,		compared to	classroom glazing	2002),	0.009 marks, and	
		follow-up 1 and		lower levels		Episodic memory	to decrease of	
		2 years (waves 2		of noise		– Child Memory	recognition	
		and 3) after				Scale, (Cohen,	memory by 0.031	
		changeover of				1997); Sustained	marks.	
		airports				attention –	Type of analyses:	
		RANCH study:				Toulouse Pieron	Multilevel	
		n=857, aged 9-				test (Toulouse et	modeling	
		10yrs, around				al, 1986);	Sample size	

		the airport Cross-sectional study				Working memory – Search and Memory test (Smith and Miles, 1987: Hygge et al	relating to the effect size: n=326 (Munich study), n=842 for BANCH study	
						2003)	To aver study	
5.	Clark et al, Am J	Population:	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:
	Epidemol, 2012	school children,	aircraft noise	lower levels	Modelled	Reading	Increase of	Findings:
		total n=960,	levels at nome and	of noise	concentrations of	comprenension	aircraft noise at	Moderate
		aged 9-10yrs.	at school	exposure	NUZ (µg/m3);	Suffork Reading	school by 1 dBA	correlation
		cross sectional	area from 7 am to		socio-economic	(SRS2) (Hadley	decrease of the	levels and aircraft
		Study	11 nm· road traffic		(employment	(3032) $(11agley)$	nerformance on	noise and road
			noise at school		housing tenure	Readibility Index	the following	traffic noise
			combined from		home crowding).	for elementary and	tests: reading	No association
			measurements		maternal	Special Education	comprehension	between road
			and models		education,	(Staphorsius,	(by 0.01 marks),	traffic noise and
			Noise source:		ethnicity, main	1994), Ecaluacion	recognition	reading
			aircraft and road		language spoken	Comprension	memory (by	comprehension
			traffic		at home; age,	Lectora ECL-2 (De	0.045 marks),	
			Noise metrics:		gender, long-	La Cruz, 1999);	information	
			LAeq, 16h (dBA)		standing illness,	Episodic memory	recall (by 0.043	
					parental support	tested with Child	marks) and	
					for schoolwork,	Memory scale,	conceptual recall	
					classroom glazing;	(Cohen, 1997)	(by 0.015 marks).	
					other noise	Working memory	Type of analyses:	
					exposure source	(Search and	Multilevel linear	
						Memory test,	and logistic	
						Hygge et al, 2003).	regression	
							Sample size	
							relating to the	
							effect size:	
							n=719 with air	
							pollution data	
							and n=241	
							without air	
							pollution data	
6.	Matheson et al,	Population:	Noise exposure:	Comparator:	Confounding:	Outcome:	Findings:	Comments:

	Noise Health,	school children,	aircraft noise	lower levels	age, gender,	Episodic memory	Increase of road	Findings:
	2010	89 schools	levels at home and	of noise	country, socio-	(including	traffic noise by 1	Aircraft noise
		around three	at school	exposure	economic status	information recall,	dB was	was not
		airports, total	measured or		(employment,	conceptual recall,	associated with	significantly
		n=2844, aged 9-	modeled in an		home ownership,	recognition	an increase of	related to either
		13yrs.	area; road traffic		home crowding),	memory) tested	information	information
		Sampling: 3207	noise at school		mother's	with Children's	recall by 0.038	recall or
		children	combined from		educational	Memory scale	marks and an	conceptual recall.
		approached;	measurements		attainment,	(Cohen, 1997);	increase of	Road traffic noise
		2844 pupils	and models; acute		long-standing	Prospective	conceptual recall	was not
		participated;	noise		illness, main	memory test	by 0.013 marks.	significantly
		response rate:	measurements		language spoken	(Shield and	Increase of	related to either
		89% of children,	Noise source:		at home, parental	Dockrell, 2002)	aircraft noise by	recognition
		80% of parents	aircraft and road		support for school	Working memory	1 dB was	memory or
		Cross sectional	traffic		work, other noise	(Search and	associated with a	prospective
		study	Noise metrics:		source; dyslexia,	Memory test,	decrease of	memory.
			LAeq, 16h (dBA)		acute noise during	Hygge et al 2003).	recognition	
					testing		memory by 0.018	
							marks but was	
							not related to	
							prospective	
							memory.	
							Type of analyses:	
							Multilevel linear	
							regression	
							analyses	
							Sample size	
							relating to the	
							effect size:	
							n=2844 with	
							complete data	
7.	Van Kempen et	Population:	Noise exposure:	Compared to:	Confounding:	Outcome:	Findings:	Comments:
	al, Enviro	school children	home and school	lower levels	Age, gender, main	1)	Positive and	Findings:
	Health, 2010	from 24 schools	addresses for each	of noise	language spoken	Neurobehavioral	significant	Significant
		around	children linked to	exposure	at home, long-	evaluation system	relation between	correlation
		Amsterdam	modelled noise		standing illness,	(NES) tests (Letz,	aircraft noise	between aircraft
		airport, 620	levels		parental support	1001): Simple	exposure at	and road traffic
		children	Noise source:		for school work,	Reaction Time	school and the	noise levels.
		approached,	aircraft and road		school glazing,	Test, Switching	number of errors	No relation

		total sample	traffic		socio-economic	Attention Test	on Switching	hetween aircraft
		n=553 aged 9-	Noise metrics:		status (crowding	Hand-Eve-	Attention test	noise exposure at
		11vrs	LAeg 7-23h (dBA)		home ownership	Coordination Test	(SAT)	school and other
		Cross-sectional	for aircraft noise		narental	Symbol-Digit	Positive and	NFS tests no
		study	IAeq 7-23h (dBA)		employment	Substitution Test	significant	relation between
		study	for road traffic		mother's	Digit Memory Span	relation between	aircraft noise
					education) the	Tost	road traffic noise	
			noise		other noise source	2) Other cognitive	at school and the	home and
					other hoise source	2) Other togintive	number of errors	cognitive
						Ponding	on SAT tost	outcomos
						comprehension	Turna of analyzas:	No relation
							Type of analyses.	hotwoon road
						(CRIE LESI,	analyses by	traffic noise
						Staphorsius, 1994);	All VED proceedure	craffic fioise
						Prospective		exposure at
						initials where	sample size	nome and
						initials where	relating to the	cognitive
						Instructed);	effect size: n=433	outcomes.
						Episodic memory	children with	
						(Child Memory	complete data	
						scale, Conen,		
						1997); Working		
						memory (Search		
						and Memory test,		
						Hygge et al, 2003);		
						Sustained		
						attention		
						(Toulouse Pieron		
						test, Toulouse et		
						al, 1986)		
8.	Van Kempen et	Population:	Noise exposure:	Compared to:	Confounding:	Outcomes:	Findings:	Comments:
	al, Enviro Res,	school children	home and school	lower levels	Modelled	Neurobehavioral	Positive and	Findings:
	2012	from 24 schools	addresses for each	of noise	concentrations of	evaluation system	significant	Positive
		around	children linked to	exposure	NO2 (µg/m3) and	(NES) tests (Letz,	relation between	correlation
		Amsterdam	modelled noise		particulate matter	1001): Simple	road traffic noise	between aircraft
		airport, 620	levels		(PM10);	Reaction Time	at school and the	and road traffic
		children	Noise source:		Age, gender, main	Test, Switching	number of errors	noise levels at
		approached,	aircraft and road		language spoken	Attention Test,	on SAT test;	home and school;
		total sample	traffic		at home, long-	Hand-Eye-	Positive and	positive
		n=553, aged 9-	Noise metrics:		standing illness,	Coordination Test,	significant	correlation

		11yrs	LAeq 7-23h (dBA)		parental support	Symbol-Digit	relation between	between NO2
		Cross-sectional	for aircraft noise;		for school work,	Substitution Test,	aircraft noise at	and PM10 at
		study	LAeq 7-23h (dBA)		school glazing,	Digit Memory Span	school and the	home and school.
			for road traffic		socio-economic	Test.	number of errors	NO2 level at
			noise		status (crowding.		on SAT test: both	school
					home ownership.		significant after	significantly
					narental		adjustment for	associated with
					employment		NO2	snan length
					mother's		concentration at	measured with
					education)		school	
					education		Type of analyses:	No relation
							multilevel model	hetween aircraft
							analysos by	and road traffic
							MIVED procedure	
							Sample size	home and
							sample size	nome anu
							offect sizes p=495	cognitive
							childron with	Combined
							ciliuren with	
							complete data	exposure to NO2
								and road traffic
								noise nad effect
								on reaction times
								measured with
								SRII and the
								number of errors
			-					on SAT.
9.	Klatte et al,	Population: 85	Noise exposure:	Comparison:	Confounding:	Outcomes:	Findings:	Comments:
	Report, NORAH	second-grade	Noise contours at	Change	Migrant	Reading test:	A 10 dB increase	Methods:
	study, 2014	classes from 29	school and at	estimate per	background.	standardized	in aircraft noise	Impossible to
		primary schools	home around	10 dBA	Children's	comprehension	associated with a	separate home
		around	airport	increase	exposure to road	test for primary	decrement of	and schools
		Frankfurt/Main	Noise source:		traffic and railway	school children	one-tenth of an	exposure (high
		airport; children:	aircraft noise		noise. Also used	(ELFE 1-6, Lenhard	SD on the	correlation).
		total n=1243,	Noise metrics: Leq		as confounders:	& Schneider,	reading test,	Findings:
		age 8yrs,	around schools		auditory thinking,	2006).	corresponding to	Significant
		4months	(time 8-14h);		phonological	Language	a one month	confounding of
		Cross-sectional	average 49.5 dB,		awareness,	functions – speech	reading delay in	migrant
		study	Median 50.6 dB;		episodic memory.	perception,	this test.	background –
			range 39 to 59 dB;		Class	auditory thinking,	Similar results for	aircraft noise

	Leg at home (6-	characteristics	nhonological	subscales: word	(both home and
	18h)	(size proportion	short-term	and text	school) strongly
	Noise groups:	of migrants	memory	comprehension	affects reading
	3 groups at school	socioeconomic	, nhonological	Similar results	comprehension
	low ovposuro < 47	socioeconomic		found for aircraft	of
	dD_{1}	status, parenta	awareness,		uithout
	ub; midule	engagement),	episodic memory	Turne of organization	without
	exposure 47 to <	classroom	test.	Type of analyses:	migration
	55 dB; high	reverberation and	Other outcomes:	Multilevel	background (1.5-
	exposure ≥ 55 dB	insulation.	Health-related	regression	2.5 months
			quality of life, well-	Sample size	reading delay).
			being at home and	relating to the	No effect of
			school, noise	effect size:	aircraft noise on
			annoyance at	n=1090	tested language
			home and school.		functions.
					Aircraft noise at
					school and at
					home
					significantly
					Significantly
					associated with
					annoyance.
					Aircraft noise
					was associated
					with less positive
					judgments of
					health-related
					quality of life,
					well-being at
					school, and sleep
					quality.