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### **Supplemental Material**

#### **Impact of Long-Term Exposure to Wind Turbine Noise on Redemption of Sleep Medication and Antidepressants: A Nationwide Cohort Study**

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#### **Table of Contents**

**Table S1.** Characteristics of the populations for study of redemption of sleep medication and antidepressants, respectively, at start of follow-up according to residential low frequency exposure to indoor wind turbine noise calculated as mean exposure during the preceding year.

**Table S2.** Characteristics of the populations for study of redemption of sleep medication and antidepressants, respectively, at start of follow-up, according to residential exposure to outdoor and indoor low frequency wind turbine noise calculated as mean exposure during the preceding year.

**Table S3.** Pearson correlation coefficients between different noise metrics above the reference level (24 dB outdoor WTN and 5 dB indoor LF WTN) preceding entry into the study population.

**Table S4.** Associations between 5-year exposure to outdoor wind turbine noise and redemption of sleep medication and antidepressants in different sub-populations.

**Table S5.** Associations between 5-year exposure to indoor low frequency wind turbine noise and redemption of sleep medication and antidepressants in different sub-populations.

**Supplement Table 1** Characteristics of the populations for study of redemption of sleep medication and antidepressants, respectively, at start of follow-up according to residential low frequency exposure to indoor wind turbine noise calculated as mean exposure during the preceding year

Characteristics at entry	Indoor low frequency wind turbine noise		
	< 10 dB Sleep / antidepressants (N = 579,821 / 580,838)	10-15 dB Sleep / antidepressants (N = 3,840 / 3,757)	≥ 15 dB Sleep / antidepressants (N = 307 / 296)
<i>Men</i>	52 / 52 %	54 / 54 %	50 / 52 %
<i>Age</i>			
< 40 years	45 / 43 %	63 / 62 %	60 / 59 %
40-50 years	19 / 19 %	18 / 18 %	18 / 17 %
50-60 years	16 / 16 %	11 / 11 %	11 / 12 %
≥ 60 years	21 / 22 %	8 / 9 %	10 / 11 %
<i>Year of entry</i>			
1996-2000	55 / 57 %	24 / 26 %	38 / 39 %
2001-2005	14 / 14 %	27 / 28 %	18 / 16 %
2006-2010	20 / 20 %	30 / 30 %	27 / 29 %
2011-2013	10 / 9 %	18 / 17 %	17 / 16 %
<i>Personal income</i>			
Quartile 1 (low)	20 / 20 %	19 / 19 %	17 / 19 %
Quartile 2	24 / 23 %	26 / 25 %	26 / 26 %
Quartile 3	26 / 26 %	27 / 27 %	27 / 26 %
Quartile 4 (high)	25 / 25 %	21 / 23 %	23 / 23 %
Unknown	6 / 6 %	6 / 6 %	6 / 6 %
<i>Highest attained education</i>			
Basic or high school	35 / 35 %	30 / 30 %	31 / 31 %
Vocational	43 / 42 %	51 / 51 %	48 / 49 %
High	16 / 16 %	16 / 17 %	17 / 16 %
Unknown	6 / 7 %	2 / 2 %	5 / 4 %
<i>Marital status</i>			
Married	55 / 56 %	42 / 42 %	52 / 52 %
Divorced/widow(er)	14 / 14 %	12 / 12 %	11 / 11 %
Never married	31 / 30 %	47 / 46 %	37 / 37 %
<i>Attachment to labor market</i>			
Working	69 / 69 %	79 / 80 %	80 / 80 %
Retired	18 / 19 %	7 / 7 %	8 / 9 %
Other	13 / 13 %	13 / 13 %	11 / 11 %
<i>Area-level income<sup>a</sup></i>			
Quartile 1 (low)	23 / 23 %	10 / 10 %	11 / 10 %
Quartile 2	28 / 28 %	28 / 27 %	30 / 30 %
Quartile 3	28 / 28 %	34 / 34 %	35 / 35 %
Quartile 4 (high)	19 / 19 %	21 / 22 %	18 / 18 %
Unknown	2 / 2 %	7 / 7 %	7 / 7 %
<i>Type of dwelling</i>			
Farm	14 / 14 %	43 / 43 %	46 / 46 %
Single-family detached house	62 / 62 %	52 / 51 %	48 / 47 %
Others	24 / 24 %	5 / 6 %	6 / 7 %
<i>Distance to major road<sup>b</sup></i>			
< 500 m	35 / 35 %	15 / 15 %	14 / 13 %
500-2,000 m	27 / 27 %	23 / 24 %	19 / 19 %

$\geq 2,000$ m	37 / 37 %	62 / 61 %	67 / 68 %
<i>Traffic load within 500 m (<math>10^3</math> vehicle km/day) <sup>c</sup></i>			
< 2.5	34 / 34 %	70 / 70 %	80 / 80 %
2.5-5.3	25 / 25 %	14 / 14 %	5 / 5 %
5.3-9.7	19 / 19 %	11 / 11 %	9 / 9 %
> 9.7	22 / 22 %	5 / 5 %	5 / 5 %
<i>Tree coverage <sup>c</sup></i>			
< 5%	13 / 13 %	33 / 33 %	38 / 38 %
5-20 %	63 / 63 %	60 / 60 %	53 / 53 %
> 20 %	24 / 24 %	7 / 7 %	8 / 8 %

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<sup>a</sup> Average disposable household income among all households in a 100\*100 m grid cell

<sup>b</sup> Major road defined as  $\geq 5,000$  vehicles per day

<sup>c</sup> In a 500 meters radius around the dwelling

**Supplement Table 2** Characteristics of the populations for study of redemption of sleep medication and antidepressants, respectively, at start of follow-up, according to residential exposure to outdoor and indoor low frequency wind turbine noise calculated as mean exposure during the preceding year

	Outdoor wind turbine noise			Indoor LF wind turbine noise		
	< 36 dB Sleep / antidepressants (N = 575,899 / 576,857)	36-42 dB Sleep / antidepressants (N = 6,704 / 6,637)	≥ 42 dB Sleep / antidepressants (N = 1,365 / 1,397)	< 10 dB Sleep / antidepressants (N = 579,821 / 580,838)	10-15 dB Sleep / antidepressants (N = 3,840 / 3,757)	≥ 15 dB Sleep / antidepressants (N = 307 / 296)
<i>Outdoor wind turbine noise (1-year mean)</i>						
< 24 dB	78 / 79 %	-	-	78 / 78 %	-	-
24-30 dB	16 / 15 %	-	-	16 / 15 %	1 / 1 %	-
30-36 dB	6 / 5 %	-	-	5 / 5 %	45 / 45 %	2 / 2 %
36-42 dB	-	100 %	-	1 / 1 %	38 / 38 %	48 / 47 %
≥ 42 dB	-	-	100 %	0 / 0 %	16 / 17 %	50 / 51 %
<i>Indoor LF wind turbine noise (1-year mean)</i>						
< 5 dB	97 / 97 %	27 / 28 %	7 / 7 %	97 / 97 %	-	-
5-10 dB	3 / 2 %	48 / 49 %	38 / 37 %	3 / 3 %	-	-
10-15 dB	0 / 0 %	22 / 21 %	44 / 45 %	-	100 / 100 %	-
≥ 15 dB	0 / 0 %	2 / 2 %	11 / 11 %	-	-	100 / 100 %
<i>Distance to nearest wind turbine</i>						
< 500 m	8 / 7 %	94 / 94 %	97 / 97%	8 / 8 %	67 / 67 %	93 / 93 %
500-1,000 m	22 / 22 %	5 / 4 %	1 / 1 %	22 / 22 %	32 / 31 %	5 / 5 %
1,000-2,000m	34 / 34 %	1 / 1 %	1 / 1 %	34 / 34 %	1 / 1 %	1 / 1 %
≥ 2,000 m	36 / 37 %	1 / 1 %	1 / 2 %	36 / 36 %	1 / 1 %	1 / 1 %
<i>Total height, nearest wind turbine</i>						
< 35 m	31 / 31 %	32 / 33 %	65 / 66 %	31 / 32 %	12 / 13 %	19 / 20 %
35-70 m	56 / 56 %	58 / 58 %	33 / 33 %	56 / 56 %	57 / 57 %	62 / 61 %
70-100 m	11 / 10 %	9 / 8 %	1 / 1 %	11 / 10 %	28 / 27 %	17 / 18 %
≥ 100 m	2 / 1 %	1 / 1 %	0 / 0 %	1 / 1 %	3 / 3 %	2 / 2 %

LF: low frequency

**Supplement Table 3** Pearson correlation coefficients between different noise metrics above the reference level (24 dB outdoor WTN and 5 dB indoor LF WTN) preceding entry into the study population

	Outdoor WTN 1-y mean	Outdoor WTN 5-y mean	Indoor LF WTN 1-y mean	Indoor LF WTN 5-y mean
Outdoor WTN 1-y mean	1	0.78	0.63	0.60
Outdoor WTN 5-y mean		1	0.36	0.71
Indoor LF WTN 1-y mean			1	0.79
Indoor LF WTN 5-y mean				1

WTN = wind turbine noise; LF = low frequency; y = year

**Supplement Table 4** Associations between 5-year exposure to outdoor wind turbine noise and redemption of sleep medication and antidepressants in different sub-populations

Sub-populations	Exposure categories	Sleep medication		Antidepressants	
		N cases	Adjusted HR (95 % CI) <sup>a</sup>	N cases	Adjusted HR (95 % CI) <sup>a</sup>
<i>All<sup>b</sup></i>					
	< 24 dB	50,559	1 (ref)	60,315	1 (ref)
	24-30 dB	13,021	1.03 (1.01-1.05)	15,958	1.02 (1.00-1.04)
	30-36 dB	4,133	1.03 (1.00-1.06)	5,016	1.02 (0.99-1.05)
	36-42 dB	814	1.08 (1.00-1.15)	899	1.01 (0.95-1.08)
	≥ 42 dB	169	1.14 (0.98-1.33)	185	1.17 (1.01-1.35)
<i>First redemption after 2005</i>					
	< 24 dB	22,465	1 (ref)	31,191	1 (ref)
	24-30 dB	6,510	1.03 (1.00-1.05)	9,128	1.03 (1.01-1.06)
	30-36 dB	2,031	1.03 (0.98-1.07)	2,818	1.02 (0.98-1.06)
	36-42 dB	331	1.03 (0.93-1.15)	452	1.04 (0.94-1.14)
	≥ 42 dB	48	1.24 (0.93-1.64)	61	1.21 (0.94-1.56)
<i>Living on a farm</i>					
	< 24 dB	4,932	1 (ref)	5,548	1 (ref)
	24-30 dB	2,025	0.95 (0.90-1.00)	2,453	0.96 (0.92-1.01)
	30-36 dB	1,105	1.00 (0.94-1.07)	1,273	0.95 (0.90-1.01)
	36-42 dB	344	1.10 (0.98-1.22)	335	0.92 (0.82-1.02)
	≥ 42 dB	57	1.04 (0.80-1.35)	53	0.91 (0.70-1.20)
<i>Nearest wind turbine ≥ 35 m (total height)</i>					
	< 24 dB	38,379	1 (ref)	46,487	1 (ref)
	24-30 dB	11,062	1.02 (1.00-1.05)	13,804	1.02 (1.00-1.04)
	30-36 dB	3,471	1.04 (1.00-1.07)	4,225	1.01 (0.98-1.04)

36-42 dB	600	1.06 (0.98-1.15)	707	1.04 (0.96-1.12)
≥ 42 dB	80	1.25 (1.00-1.55)	84	1.15 (0.93-1.43)
<i>High validity score of noise estimate<sup>c</sup></i>				
< 24 dB	37,811	1 (ref)	45,734	1 (ref)
24-30 dB	8,227	1.04 (1.02-1.07)	10,524	1.03 (1.01-1.05)
30-36 dB	2,536	1.03 (0.98-1.07)	3,275	1.02 (0.98-1.06)
36-42 dB	402	1.11 (1.01-1.23)	472	1.03 (0.94-1.13)
≥ 42 dB	19	0.81 (0.52-1.27)	34	1.25 (0.89-1.74)
<i>Dwelling ≥ 2,000 m from major road<sup>d</sup></i>				
< 24 dB	16,218	1 (ref)	19,395	1 (ref)
24-30 dB	6,078	1.02 (0.99-1.05)	7,517	1.01 (0.98-1.04)
30-36 dB	2,212	0.99 (0.95-1.04)	2,737	0.99 (0.95-1.03)
36-42 dB	434	0.98 (0.89-1.08)	491	0.94 (0.86-1.02)
≥ 42 dB	98	1.13 (0.93-1.38)	117	1.27 (1.06-1.52)
<i>Less than 5 % tree coverage<sup>e</sup></i>				
< 24 dB	5,350	1 (ref)	6137	1 (ref)
24-30 dB	2,205	1.01 (0.96-1.06)	2710	1.02 (0.98-1.07)
30-36 dB	911	0.97 (0.90-1.04)	1121	0.99 (0.93-1.05)
36-42 dB	227	1.02 (0.89-1.16)	262	1.00 (0.89-1.13)
≥ 42 dB	41	0.98 (0.72-1.33)	43	0.97 (0.72-1.30)

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HR: hazard ratio; CI: confidence interval

<sup>a</sup> Adjusted for age, sex, calendar-year, personal income, education, marital status, work-marked affiliation, area-level socioeconomic status, type of dwelling, traffic load in 500 m radius and distance to major road.

<sup>b</sup> Corresponding to HRs and CIs in Table 2

<sup>c</sup> Includes only situations with validity score better than the median among those with exposures ≥ 10 dB. The validity score reflects the estimated uncertainty associated with all aspects of noise estimation at a specific address and day.

<sup>d</sup> Major road defined as ≥ 5,000 vehicles per day

<sup>e</sup> In a 500 meters radius around the dwelling

**Supplement Table 5** Associations between 5-year exposure to indoor low frequency wind turbine noise and redemption of sleep medication and antidepressants in different sub-populations

Sub-populations	Exposure categories	Sleep medication		Antidepressants	
		N cases	Adjusted HR (95 % CI) <sup>a</sup>	N cases	Adjusted HR (95 % CI) <sup>a</sup>
<i>All<sup>b</sup></i>					
	< 5 dB	65,202	1 (ref)	77,995	1 (ref)
	5-10 dB	2,911	1.05 (1.01-1.09)	3,663	1.04 (1.00-1.07)
	10-15 dB	542	1.04 (0.96-1.14)	672	1.01 (0.94-1.10)
	≥ 15 dB	41	1.03 (0.76-1.40)	43	0.94 (0.70-1.27)
<i>First redemption after 2005</i>					
	< 5 dB	29,225	1 (ref)	40,689	1 (ref)
	5-10 dB	1,786	1.05 (1.00-1.10)	2,457	1.04 (1.00-1.08)
	10-15 dB	343	0.99 (0.89-1.10)	471	0.99 (0.90-1.09)
	≥ 15 dB	31	1.35 (0.95-1.91)	33	1.12 (0.79-1.57)
<i>Living on a farm</i>					
	< 5 dB	7262	1 (ref)	8,250	1 (ref)
	5-10 dB	935	1.02 (0.95-1.09)	1,114	0.99 (0.93-1.05)
	10-15 dB	248	1.05 (0.92-1.19)	278	0.94 (0.84-1.06)
	≥ 15 dB	18	0.92 (0.58-1.47)	20	0.85 (0.55-1.31)
<i>Nearest wind turbine ≥ 35 m (total height)</i>					
	< 5 dB	50,434	1 (ref)	61,293	1 (ref)
	5-10 dB	2,633	1.04 (1.00-1.08)	3,357	1.03 (1.00-1.07)
	10-15 dB	488	1.03 (0.94-1.13)	619	1.02 (0.94-1.10)
	≥ 15 dB	37	1.10 (0.79-1.51)	38	0.96 (0.70-1.32)

*High validity score of noise estimate<sup>c</sup>*



< 5 dB	35,572	1 (ref)	43,189	1 (ref)
5-10 dB	1,330	1.11 (1.05-1.18)	1,654	1.03 (0.98-1.09)
10-15 dB	217	0.90 (0.79-1.03)	338	1.06 (0.95-1.18)
≥ 15 dB	18	1.20 (0.75-1.90)	17	0.92 (0.57-1.49)
<i>Dwelling ≥ 2,000 m from major road<sup>d</sup></i>				
< 5 dB	23,096	1 (ref)	27,843	1 (ref)
5-10 dB	1,602	1.03 (0.98-1.09)	1,981	1.00 (0.95-1.05)
10-15 dB	310	0.95 (0.85-1.06)	399	0.95 (0.86-1.05)
≥ 15 dB	32	1.13 (0.80-1.60)	34	1.03 (0.74-1.44)
<i>Less than 5 % tree coverage<sup>e</sup></i>				
< 5 dB	7,885	1 (ref)	9,209	1 (ref)
5-10 dB	666	1.00 (0.93-1.09)	836	1.00 (0.93-1.08)
10-15 dB	166	1.00 (0.85-1.16)	208	0.98 (0.85-1.12)
≥ 15 dB	17	1.01 (0.63-1.63)	20	0.97 (0.63-1.51)

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HR: hazard ratio; CI: confidence interval

<sup>a</sup> Adjusted for age, sex, calendar-year, personal income, education, marital status, work-marked affiliation, area-level socioeconomic status, type of dwelling, traffic load in 500 m radius and distance to major road.

<sup>b</sup> Corresponding to HRs and CIs in Table 3

<sup>c</sup> Includes only situations with validity score better than the median among those with exposures ≥ 10 dB. The validity score reflects the estimated uncertainty associated with all aspects of noise estimation at a specific address and day.

<sup>d</sup> Major road defined as ≥ 5,000 vehicles per day

<sup>e</sup> In a 500 meters radius around the dwelling