

**Supplementary Table A: Pairwise associations between neurological symptoms**

**a) All subjects**

Difficulty remembering things	<b>42.9</b>					
Difficulty with handwriting	11.7	8.0				
Difficulty speaking	20.0	17.5	21.1			
Sensitivity to smells	5.1	3.7	5.7	6.8		
Sensitivity to alcohol effects	9.2	6.1	7.1	12.4	9.6	
Tiredness and lack of energy	15.8	7.8	6.2	9.2	4.7	<b>8.8</b>
	Difficulty concentrating	Difficulty remembering things	Difficulty with handwriting	Difficulty speaking	Sensitivity to smells	Sensitivity to alcohol effects

Associations are summarised by odds ratios.

**b) Never worked with pesticides**

Difficulty remembering things	<b>51.5</b>					
Difficulty with handwriting	11.1	<b>9.5</b>				
Difficulty speaking	25.1	20.6	21.2			
Sensitivity to smells	5.1	3.5	5.7	7.3		
Sensitivity to alcohol effects	9.1	<b>6.9</b>	5.3	11.8	7.5	
Tiredness and lack of energy	14.8	8.4	6.3	9.2	4.3	<b>6.6</b>
	Difficulty concentrating	Difficulty remembering things	Difficulty with handwriting	Difficulty speaking	Sensitivity to smells	Sensitivity to alcohol effects

Associations are summarised by odds ratios.

**c) Ever worked with sheep dip**

Difficulty remembering things	<b>23.6</b>					
Difficulty with handwriting	<b>16.7</b>	6.8				
Difficulty speaking	15.1	15.8	25.5			
Sensitivity to smells	5.3	3.8	5.6	6.1		
Sensitivity to alcohol effects	10.0	5.8	10.3	17.7	15.8	
Tiredness and lack of energy	14.5	4.8	7.3	10.9	6.0	15.2
	Difficulty concentrating	Difficulty remembering things	Difficulty with handwriting	Difficulty speaking	Sensitivity to smells	Sensitivity to alcohol effects

Associations are summarised by odds ratios.

**d) Ever worked with insecticides, never with sheep dip**

Difficulty remembering things	<b>76.8</b>					
Difficulty with handwriting	8.0	5.2				
Difficulty speaking	20.8	13.5	13.3			
Sensitivity to smells	4.2	2.7	6.2	2.6		
Sensitivity to alcohol effects	11.6	6.3	7.6	16.2	4.9	
Tiredness and lack of energy	25.2	11.5	3.9	7.3	3.8	10.8
	Difficulty concentrating	Difficulty remembering things	Difficulty with handwriting	Difficulty speaking	Sensitivity to smells	Sensitivity to alcohol effects

Associations are summarised by odds ratios.

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**e) Ever worked with other pesticides, never with sheep dip or insecticides**

Difficulty remembering things	<b>36.7</b>					
Difficulty with handwriting	<b>8.3</b>	6.2				
Difficulty speaking	9.6	11.6	18.4			
Sensitivity to smells	4.6	4.4	5.5	10.7		
Sensitivity to alcohol effects	6.1	3.3	7.8	5.5	11.3	
Tiredness and lack of energy	17.5	10.0	5.0	8.3	4.2	8.8
	Difficulty concentrating	Difficulty remembering things	Difficulty with handwriting	Difficulty speaking	Sensitivity to smells	Sensitivity to alcohol effects

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Associations are summarised by odds ratios.

**Supplementary Table B: Associations of pesticide exposure with neurological symptoms by stratum of somatising tendency**

**a) Somatising tendency score 0**

Risk Factor	All subjects	3+ neurological symptoms <sup>a</sup>		4+ neurological symptoms <sup>a</sup>		Anxiety <sup>a,b</sup>		Depression <sup>a,b</sup>		
	n	n	PR (95% CI) <sup>c</sup>	n	PR (95% CI) <sup>c</sup>	n	PR (95% CI) <sup>c</sup>	n	PR (95% CI) <sup>c</sup>	
<b>Occupational exposure to pesticides</b>										
Never worked with pesticides	3317	46	1.0 -	23	1.0 -	369	1.0 -	191	1.0 -	
Ever worked with sheep dip	979	23	1.7 (1.0 - 2.9)	11	1.7 (0.8 - 3.4)	112	1.0 (0.8 - 1.2)	69	1.2 (0.9 - 1.6)	
Ever worked with insecticides, never with sheep dip	443	9	1.3 (0.6 - 2.7)	3	0.9 (0.3 - 2.9)	39	0.7 (0.5 - 1.0)	25	0.9 (0.6 - 1.4)	
Ever worked with other pesticides, never with sheep dip or insecticides	524	9	1.2 (0.6 - 2.4)	1	0.3 (0.0 - 2.0)	52	0.8 (0.6 - 1.1)	25	0.8 (0.5 - 1.2)	

<sup>a</sup> For each outcome, the comparator for risk estimates was all subjects who did not have the outcome.

<sup>b</sup> Possible or probable.

<sup>c</sup> Adjusted for age (in eight bands) and area.

**b) Somatising tendency score 0.1 - 0.5**

Risk Factor	All subjects	3+ neurological symptoms <sup>a</sup>		4+ neurological symptoms <sup>a</sup>		Anxiety <sup>a,b</sup>		Depression <sup>a,b</sup>		
	n	n	PR (95% CI) <sup>c</sup>	n	PR (95% CI) <sup>c</sup>	n	PR (95% CI) <sup>c</sup>	n	PR (95% CI) <sup>c</sup>	
<b>Occupational exposure to pesticides</b>										
Never worked with pesticides	1701	54	1.0 -	14	1.0 -	341	1.0 -	184	1.0 -	
Ever worked with sheep dip	522	15	0.8 (0.5 - 1.5)	4	0.9 (0.3 - 2.8)	119	1.1 (0.9 - 1.3)	71	1.3 (1.0 - 1.7)	
Ever worked with insecticides, never with sheep dip	223	7	1.0 (0.4 - 2.2)	0	not estimable	53	1.1 (0.8 - 1.4)	22	0.8 (0.5 - 1.3)	
Ever worked with other pesticides, never with sheep dip or insecticides	259	15	1.9 (1.0 - 3.3)	4	2.4 (0.8 - 7.3)	78	1.4 (1.1 - 1.7)	26	0.9 (0.6 - 1.4)	

<sup>a</sup> For each outcome, the comparator for risk estimates was all subjects who did not have the outcome.

<sup>b</sup> Possible or probable.

<sup>c</sup> Adjusted for age (in eight bands) and area.

c) Somatising tendency score 0.6 - 1.0

Risk Factor	All subjects	3+ neurological symptoms <sup>a</sup>		4+ neurological symptoms <sup>a</sup>		Anxiety <sup>a,b</sup>		Depression <sup>a,b</sup>		
	n	n	PR (95% CI) <sup>c</sup>	n	PR (95% CI) <sup>c</sup>	n	PR (95% CI) <sup>c</sup>	n	PR (95% CI) <sup>c</sup>	
<b>Occupational exposure to pesticides</b>										
Never worked with pesticides	718	80	1.0 -	35	1.0 -	266	1.0 -	180	1.0 -	
Ever worked with sheep dip	262	29	1.0 (0.6 - 1.5)	13	1.0 (0.5 - 1.9)	116	1.1 (0.9 - 1.4)	61	0.9 (0.7 - 1.2)	
Ever worked with insecticides, never with sheep dip	104	12	1.0 (0.5 - 1.8)	5	1.1 (0.4 - 2.7)	45	1.1 (0.8 - 1.5)	22	0.8 (0.5 - 1.3)	
Ever worked with other pesticides, never with sheep dip or insecticides	130	15	1.0 (0.6 - 1.8)	7	1.2 (0.5 - 2.7)	44	0.9 (0.6 - 1.2)	27	0.8 (0.5 - 1.2)	

<sup>a</sup> For each outcome, the comparator for risk estimates was all subjects who did not have the outcome.

<sup>b</sup> Possible or probable.

<sup>c</sup> Adjusted for age (in eight bands) and area.

d) Somatising tendency score >1.0

Risk Factor	All subjects	3+ neurological symptoms <sup>a</sup>		4+ neurological symptoms <sup>a</sup>		Anxiety <sup>a,b</sup>		Depression <sup>a,b</sup>		
	n	n	PR (95% CI) <sup>c</sup>	n	PR (95% CI) <sup>c</sup>	n	PR (95% CI) <sup>c</sup>	n	PR (95% CI) <sup>c</sup>	
<b>Occupational exposure to pesticides</b>										
Never worked with pesticides	323	61	1.0 -	37	1.0 -	192	1.0 -	145	1.0 -	
Ever worked with sheep dip	130	43	1.7 (1.2 - 2.6)	29	2.0 (1.2 - 3.3)	73	1.0 (0.7 - 1.3)	56	1.0 (0.7 - 1.3)	
Ever worked with insecticides, never with sheep dip	56	22	2.1 (1.3 - 3.5)	12	1.9 (1.0 - 3.7)	35	1.0 (0.7 - 1.5)	25	1.0 (0.6 - 1.5)	
Ever worked with other pesticides, never with sheep dip or insecticides	72	19	1.4 (0.9 - 2.4)	11	1.4 (0.7 - 2.7)	41	1.0 (0.7 - 1.3)	28	0.9 (0.6 - 1.3)	

<sup>a</sup> For each outcome, the comparator for risk estimates was all subjects who did not have the outcome.

<sup>b</sup> Possible or probable.

<sup>c</sup> Adjusted for age (in eight bands) and area.

**Supplementary Table C: Associations with neurological and psychiatric symptoms in past users of pesticides but not of sheep dip or insecticides**

Risk Factor	All past users of other pesticides n <sup>e</sup>	3+ neurological symptoms <sup>a</sup>				4+ neurological symptoms <sup>a</sup>				Anxiety <sup>a</sup>				Depression <sup>a</sup>							
		n	PR (95% CI) <sup>b</sup>	PR (95% CI) <sup>c</sup>	n	PR (95% CI) <sup>b</sup>	PR (95% CI) <sup>c</sup>	n	PR (95% CI) <sup>b</sup>	PR (95% CI) <sup>c</sup>	n	PR (95% CI) <sup>b</sup>	PR (95% CI) <sup>c</sup>								
<b>Lifetime use of other pesticides (days)</b>																					
<10	233	6	1.0	-	1.0	-	3	1.0	-	1.0	-	50	1.0	-	1.0	-	16	1.0	-	1.0	-
10-49	301	15	1.9 (0.7 - 4.8)	1.8 (0.7 - 4.6)	4	1.0 (0.2 - 4.3)	0.8 (0.2 - 3.7)	63	1.0 (0.7 - 1.4)	0.9 (0.6 - 1.3)	33	1.5 (0.8 - 2.8)	1.5 (0.8 - 2.7)								
50+	439	36	3.1(1.3 - 7.3)	2.5 (1.1 - 6.0)	15	2.5 (0.7 - 8.6)	1.8 (0.5 - 6.4)	99	1.1 (0.7 - 1.5)	0.9 (0.6 - 1.3)	53	1.7 (0.9 - 2.9)	1.4 (0.8 - 2.5)								
<b>Handled other pesticide concentrate</b>																					
No	563	28	1.0	-	1.0	-	9	1.0	-	1.0	-	114	1.0	-	1.0	-	55	1.0	-	1.0	-
Yes	427	30	1.4 (0.8 - 2.4)	1.3 (0.7 - 2.1)	14	2.1 (0.9 - 4.9)	1.8 (0.8 - 4.3)	102	1.2 (0.9 - 1.5)	1.1 (0.8 - 1.5)	51	1.2 (0.8 - 1.8)	1.1 (0.7 - 1.6)								
<b>Ever experienced symptoms within 48 hours of work with other pesticides</b>																					
Never	942	49	1.0	-	1.0	-	18	1.0	-	1.0	-	200	1.0	-	1.0	-	98	1.0	-	1.0	-
Fever or chills <sup>d</sup>	2	2	19.7 (4.2 - 91.9)	7.7 (1.5 - 38.2)	2	38.1 (6.9 - 210.8)	10.1 (1.6 - 64.7)	2	4.0 (1.0 - 16.4)	1.9 (0.5 - 8.1)	2	6.1 (1.4 - 25.8)	2.8 (0.7 - 12.3)								
4+ symptoms <sup>d</sup>	5	4	14.6 (5.0 - 42.9)	6.6 (2.1 - 20.5)	3	27.9 (7.3 - 107.3)	9.0 (2.1 - 39.1)	4	3.1 (1.2 - 8.6)	1.8 (0.6 - 5.0)	2	2.7 (0.7 - 11.3)	1.2 (0.3 - 5.1)								

<sup>a</sup> For each outcome, the comparator for risk estimates was all subjects who did not have the outcome.

<sup>b</sup> Adjusted for age (in eight bands) and area;

<sup>c</sup> Adjusted for age, area and somatising tendency (classified as in table 3);

<sup>d</sup> These risk factors overlapped. Each was analysed separately relative to never having experienced acute symptoms.

<sup>e</sup> Information on risk factors was missing for some subjects.



Supplementary Table D: Analyses for Tables 3 - 6 repeated after exclusion of 2320 men who might have worked with pesticides in past year

Clustering of neurological symptoms according to previous work with pesticides

Number of symptoms reported <sup>a</sup>	Never worked with pesticides			Ever worked with sheep dip			Ever worked with insecticides, never with sheep dip			Ever worked with other pesticides, never with sheep dip or insecticides			All subjects		
	O <sup>b</sup>	E <sup>c</sup>	O/E <sup>d</sup>	O <sup>b</sup>	E <sup>c</sup>	O/E <sup>d</sup>	O <sup>b</sup>	E <sup>c</sup>	O/E <sup>d</sup>	O <sup>b</sup>	E <sup>c</sup>	O/E <sup>d</sup>	O <sup>b</sup>	E <sup>c</sup>	O/E <sup>d</sup>
0	4671	4044.2	1.2	440	322.7	1.4	234	180.7	1.3	297	243.4	1.2	5642	4775.1	1.2
1	893	1752.7	0.5	116	252.1	0.5	56	119.0	0.5	73	140.4	0.5	1138	2290.6	0.5
2	302	287.1	1.1	49	74.9	0.7	17	30.2	0.6	22	31.4	0.7	390	417.6	0.9
3	132	23.8	5.5	26	11.3	2.3	16	3.8	4.2	16	3.6	4.4	190	38.7	4.9
4	67	1.1	98.2	14	1.0	30.7	3	0.3	40.7	6	0.2	44.0	90	2.0	79.6
5	28	0.0		11	0.1		6	0.0		4	0.0		49	0.1	
6	10	0.0		5	0.0		2	0.0		1	0.0		18	0.0	
7	6	0.0		1	0.0		0	0.0		0	0.0		7	0.0	

<sup>a</sup> From the seven symptoms listed in Table 2.

<sup>b</sup> Observed number of subjects.

<sup>c</sup> Expected number of subjects if prevalence of each symptom were statistically independent (see text).

<sup>d</sup> Based on expected numbers rounded to two decimal points.

## Association of neurological and psychiatric symptoms with occupational exposure to pesticides and somatising tendency

Risk Factor	All subjects		3+ neurological symptoms <sup>a</sup>				4+ neurological symptoms <sup>a</sup>				Anxiety <sup>a,b</sup>				Depression <sup>a,b</sup>						
	n	n	PR (95% CI) <sup>c</sup>	PR (95% CI) <sup>d</sup>	PR (95% CI) <sup>c</sup>	PR (95% CI) <sup>d</sup>	n	PR (95% CI) <sup>c</sup>	PR (95% CI) <sup>d</sup>	n	PR (95% CI) <sup>c</sup>	PR (95% CI) <sup>d</sup>	n	PR (95% CI) <sup>c</sup>	PR (95% CI) <sup>d</sup>	n	PR (95% CI) <sup>c</sup>	PR (95% CI) <sup>d</sup>			
<b>Occupational exposure to pesticides</b>																					
Never worked with pesticides	6109	243	1.0	-	1.0	-	111	1.0	-	1.0	-	1170	1.0	-	1.0	-	701	1.0	-	1.0	-
Ever worked with sheep dip	662	57	2.2 (1.7 - 2.9)	1.8 (1.4 - 2.4)	31	2.6 (1.8 - 3.9)	2.1 (1.4 - 3.1)	149	1.2 (1.0 - 1.4)	1.1 (0.9 - 1.3)	97	1.3 (1.1 - 1.6)	1.1 (0.9 - 1.4)								
Ever worked with insecticides, never with sheep dip	334	27	2.0 (1.3 - 3.0)	1.6 (1.0 - 2.4)	11	1.8 (1.0 - 3.4)	1.4 (0.7 - 2.6)	71	1.1 (0.8 - 1.4)	1.0 (0.8 - 1.2)	43	1.0 (0.8 - 1.4)	0.9 (0.7 - 1.2)								
Ever worked with other pesticides, never with sheep dip or insecticides	419	27	1.6 (1.1 - 2.4)	1.3 (0.9 - 2.0)	11	1.5 (0.8 - 2.8)	1.2 (0.6 - 2.2)	95	1.2 (0.9 - 1.4)	1.0 (0.8 - 1.3)	51	1.0 (0.8 - 1.4)	0.9 (0.7 - 1.2)								
<b>Somatising tendency score<sup>e</sup></b>																					
0	4014	66	1.0	-	1.0	-	33	1.0	-	1.0	-	435	1.0	-	1.0	-	231	1.0	-	1.0	-
0.1 – 0.5	2090	74	2.2 (1.6 - 3.0)	2.2 (1.5 - 3.0)	18	1.1 (0.6 - 1.9)	1.0 (0.6 - 1.9)	443	2.0 (1.7 - 2.3)	2.0 (1.7 - 2.3)	238	2.0 (1.7 - 2.4)	2.0 (1.7 - 2.4)								
0.6 – 1.0	913	107	7.2 (5.3 - 9.8)	7.0 (5.2 - 9.6)	46	6.2 (4.0 - 9.7)	6.0 (3.8 - 9.4)	345	3.6 (3.1 - 4.1)	3.6 (3.1 - 4.1)	226	4.3 (3.6 - 5.2)	4.3 (3.6 - 5.2)								
>1.0	448	103	14.2 (10.4 - 19.4)	13.5 (9.9 - 18.4)	64	17.7 (11.6 - 27.0)	16.8 (11.0 - 25.6)	257	5.4 (4.7 - 6.4)	5.4 (4.6 - 6.3)	194	7.5 (6.2 - 9.1)	7.5 (6.2 - 9.1)								

<sup>a</sup> For each outcome, the comparator for risk estimates was all subjects who did not have the outcome.

<sup>b</sup> Possible or probable.

<sup>c</sup> Adjusted for age (in eight bands) and area.

<sup>d</sup> Adjusted for age and area, and also mutually adjusted.

<sup>e</sup> 81 of the 9844 subjects were excluded because somatising tendency score was missing.

## Associations with neurological and psychiatric symptoms in past users of sheep dip

Risk Factor	All past users of other pesticides n <sup>e</sup>	n	3+ neurological symptoms <sup>a</sup>				4+ neurological symptoms <sup>a</sup>				Anxiety <sup>a</sup>				Depression <sup>a</sup>						
			PR (95% CI) <sup>b</sup>		PR (95% CI) <sup>c</sup>		n	PR (95% CI) <sup>b</sup>	PR (95% CI) <sup>c</sup>		n	PR (95% CI) <sup>b</sup>	PR (95% CI) <sup>c</sup>		n	PR (95% CI) <sup>b</sup>	PR (95% CI) <sup>c</sup>				
<b>Lifetime use of other pesticides (days)</b>																					
<10	177	12	1.0	-	1.0	-	7	1.0	-	1.0	-	36	1.0	-	1.0	-	22	1.0	-	1.0	-
10-49	262	19	1.1 (0.5 - 2.3)		1.2 (0.6 - 2.4)		8	0.8 (0.3 - 2.1)		0.9 (0.3 - 2.6)		57	1.1 (0.7 - 1.7)		1.1 (0.7 - 1.7)		37	1.2 (0.7 - 2.0)		1.2 (0.7 - 2.1)	
50+	190	23	1.8 (0.9 - 3.7)		1.3 (0.6 - 2.7)		14	1.8 (0.7 - 4.8)		1.2 (0.5 - 3.1)		47	1.3 (0.8 - 2.0)		1.1 (0.7 - 1.7)		32	1.4 (0.8 - 2.5)		1.2 (0.7 - 2.2)	
<b>Handled sheep dip concentrate</b>																					
No	237	21	1.0	-	1.0	-	10	1.0	-	1.0	-	57	1.0	-	1.0	-	39	1.0	-	1.0	-
Yes	425	36	0.9 (0.6 - 1.6)		0.9 (0.5 - 1.5)		21	1.2 (0.5 - 2.5)		1.0 (0.5 - 2.3)		92	0.9 (0.6 - 1.2)		0.9 (0.6 - 1.2)		58	0.8 (0.6 - 1.3)		0.8 (0.5 - 1.2)	
<b>Ever experienced symptoms within 48 hours of work with other pesticides</b>																					
Never	520	34	1.0	-	1.0	-	15	1.0	-	1.0	-	97	1.0	-	1.0	-	70	1.0	-	1.0	-
Fever or chills <sup>d</sup>	29	8	4.2 (1.9 - 9.5)		1.9 (0.8 - 4.7)		5	6.5 (2.2 - 19.4)		2.4 (0.7 - 8.1)		12	2.3 (1.3 - 4.3)		1.2 (0.6 - 2.4)		9	2.2 (1.1 - 4.5)		1.2 (0.6 - 2.7)	
4+ symptoms <sup>d</sup>	42	10	3.9 (1.9 - 8.0)		1.7 (0.8 - 3.8)		7	6.9 (2.6 - 18.0)		2.6 (0.9 - 7.7)		18	2.6 (1.6 - 4.4)		1.3 (0.8 - 2.3)		13	2.4 (1.3 - 4.4)		1.3 (0.7 - 2.5)	

<sup>a</sup> For each outcome, the comparator for risk estimates was all subjects who did not have the outcome.

<sup>b</sup> Adjusted for age (in eight bands) and area;

<sup>c</sup> Adjusted for age, area and somatising tendency (classified as in table 3);

<sup>d</sup> These risk factors overlapped. Each was analysed separately relative to never having experienced acute symptoms.

<sup>e</sup> Information on risk factors was missing for some subjects.

**Lifetime prevalence of consultation with general practitioner because of neuro-psychiatric symptoms according to earlier work with pesticides**

Reason for consulting general practitioner	Never worked with pesticides		Ever worked with sheep dip		Ever worked with insecticides, never with sheep dip		Ever worked with other pesticides, never with sheep dip or insecticides	
	n	Prevalence (%) <sup>a</sup>	n	Prevalence (%) <sup>a</sup>	n	Prevalence (%) <sup>a</sup>	n	Prevalence (%) <sup>a</sup>
Change in personality (eg a tendency to depression or irritability)	501	8.2	76	11.6	39	11.9	42	10.1
Difficulty speaking (eg in finding the right words or getting words out)	128	2.0	23	3.4	14	4.0	12	3.0
Difficulty with handwriting	98	1.5	21	3.1	8	2.4	10	2.4
Thoughts about self-harm or committing suicide	149	2.5	28	4.3	17	5.1	22	5.3

<sup>a</sup> Prevalence rates directly standardised to the age distribution of the total study sample.