Supplemental Material

Supplemental Table 1. Prevalence distribution of experiencing neurologic symptoms most or all of the time in the previous 30 days (n=21,467).

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Supplemental Table 11. Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by race (n=21,467).

Supplemental Figure 1. Directed Acyclic Graph of the theoretical relationship between exposure to PM2.5 and ozone and neurologic symptoms.

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Supplemental Figure 3. Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by season (n=21,467).

Supplemental Figure 4. Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by sex (n=21,467).

Supplemental Figure 5. Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by age group (n=21,467).

Supplemental Figure 6. Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by ADI (n=21,467).

Supplemental Figure 7. Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by race (n=21,467).

Diagram

Description automatically generated

Supplemental Figure 1. Directed Acyclic Graph of the theoretical relationship between exposure to PM2.5 and ozone and neurologic symptoms.

Supplemental Table 1. Prevalence distribution of experiencing neurologic symptoms most or all of the time in the previous 30 days (n=21,467).

|  |  |  |
| --- | --- | --- |
| Endpoint | N | % |
| Any neurologic symptom | 6479 | 30.18 |
| Any CNS symptom | 4723 | 22 |
| Multiple CNS symptoms | 2062 | 9.61 |
| Dizzy/lightheadedness | 1517 | 7.07 |
| Nausea | 1058 | 4.93 |
| Headache | 3094 | 14.41 |
| Sweat heavily for no reason | 1955 | 9.11 |
| Heart palpitations | 742 | 3.46 |
| Any PNS symptom | 4187 | 19.5 |
| Multiple PNS symptoms | 2587 | 12.05 |
| Tingling in extremities | 2874 | 13.39 |
| Numbness in extremities | 2662 | 12.4 |
| Blurred/distorted vision | 1731 | 8.06 |
| Stumbled while walking | 780 | 3.63 |

Supplemental Table 2. Distributions of average PM2.5 and ozone exposure metrics (n=21,467).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Average exposure metric | Mean | Min | 25th percentile | Median | 75th percentile | IQR | Max |
| 30-day ozone (ppb) | 40.1 | 20.7 | 35.0 | 39.5 | 45.2 | 10.2 | 68.9 |
| 7-day ozone (ppb) | 40.2 | 18.0 | 33.9 | 38.8 | 45.9 | 12.0 | 81.7 |
| 30-day PM2.5 (μg/m3) | 8.6 | 3.2 | 7.5 | 8.4 | 9.5 | 2.0 | 19.4 |
| 7-day PM2.5 (μg/m3) | 8.5 | 2.5 | 6.9 | 8.1 | 9.6 | 2.7 | 34.1 |

Supplemental Table 3. Spearman rank correlations among 30- and 7-day PM2.5 and ozone average exposure metrics (n=21,467).1

|  |  |  |  |
| --- | --- | --- | --- |
|  | 7-day PM2.5 | 30-day ozone | 7-day ozone |
| 30-day PM2.5 | 0.59 | 0.41 | 0.22 |
| 7-day PM2.5 |  | 0.25 | 0.46 |
| 30-day ozone |  |  | 0.74 |

1For all pairwise correlation coefficients, p-value is < 0.0001.

Supplemental Table 4. Associations between average PM2.5 levels (quartiles of 30- and 7-day concentrations) and neurologic symptoms (n=21,467).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 30-day averagePM2.5 | | | | | | 7-day averagePM2.5 | | | | | |
|  |  | Covariate-adjusted1 | | | Covariate and  ozone-adjusted2 | | | Covariate-adjusted1 | | | Covariate and  ozone-adjusted3 | | |
| Outcome | Exposure | PR | 95% CI | p-trend | PR | 95% CI | p-trend | PR | 95% CI | p-trend | PR | 95% CI | p-trend |
| Any neuro | Q2 | 1.02 | (0.97, 1.08) | 0.002 | 1.02 | (0.97, 1.08) | 0.002 | 1.02 | (0.97, 1.07) | 0.85 | 1.01 | (0.96, 1.06) | 0.38 |
| Q3 | 1.09 | (1.04, 1.15) | | 1.09 | (1.03, 1.15) | | 1.05 | (1.00, 1.10) | | 1.04 | (0.98, 1.09) | |
|  | Q4 | 1.16 | (1.10, 1.22) | | 1.16 | (1.09, 1.23) | | 1.02 | (0.97, 1.07) | | 1.00 | (0.94, 1.06) | |
| Any CNS | Q2 | 1.05 | (0.98, 1.12) | 0.02 | 1.05 | (0.99, 1.13) | 0.01 | 1.04 | (0.97, 1.10) | 0.23 | 1.03 | (0.97, 1.09) | 0.57 |
|  | Q3 | 1.17 | (1.10, 1.24) | | 1.17 | (1.10, 1.25) | | 1.05 | (0.99, 1.11) | | 1.04 | (0.97, 1.10) | |
|  | Q4 | 1.22 | (1.14, 1.30) | | 1.23 | (1.14, 1.32) | | 1.06 | (1.00, 1.13) | | 1.04 | (0.97, 1.11) | |
| Multiple CNS | Q2 | 1.07 | (0.96, 1.19) | <.0001 | 1.10 | (0.99, 1.22) | <.0001 | 1.16 | (1.05, 1.27) | 0.13 | 1.17 | (1.06, 1.29) | 0.05 |
| Q3 | 1.19 | (1.08, 1.32) | | 1.24 | (1.12, 1.37) | | 1.05 | (0.96, 1.16) | | 1.08 | (0.97, 1.19) | |
|  | Q4 | 1.36 | (1.23, 1.50) | | 1.44 | (1.29, 1.61) | | 1.13 | (1.03, 1.24) | | 1.17 | (1.05, 1.30) | |
| Any PNS | Q2 | 1.03 | (0.96, 1.11) | 0.001 | 1.03 | (0.96, 1.11) | 0.001 | 1.02 | (0.95, 1.09) | 0.89 | 1.00 | (0.94, 1.07) | 0.50 |
|  | Q3 | 1.08 | (1.01, 1.16) | | 1.08 | (1.01, 1.17) | | 1.07 | (1.00, 1.14) | | 1.05 | (0.98, 1.12) | |
|  | Q4 | 1.19 | (1.11, 1.27) | | 1.19 | (1.10, 1.29) | | 1.04 | (0.97, 1.11) | | 1.00 | (0.93, 1.08) | |
| Multiple PNS | Q2 | 1.07 | (0.97, 1.17) | 0.004 | 1.07 | (0.97, 1.17) | 0.007 | 1.00 | (0.91, 1.09) | 0.40 | 0.98 | (0.90, 1.07) | 0.80 |
| Q3 | 1.12 | (1.02, 1.23) | | 1.11 | (1.01, 1.23) | | 1.04 | (0.96, 1.14) | | 1.01 | (0.92, 1.10) | |
|  | Q4 | 1.24 | (1.13, 1.36) | | 1.23 | (1.11, 1.36) | | 1.05 | (0.96, 1.14) | | 0.99 | (0.89, 1.09) | |

1Adjusted for age, sex, season, race, employment status, alcohol status, smoking status, education, income, and ADI

2Adjusted as in (1) and additionally adjusted for quartiles of 30-day average ozone concentration

3Adjusted as in (1) and additionally adjusted for quartiles of 7-day average ozone concentration

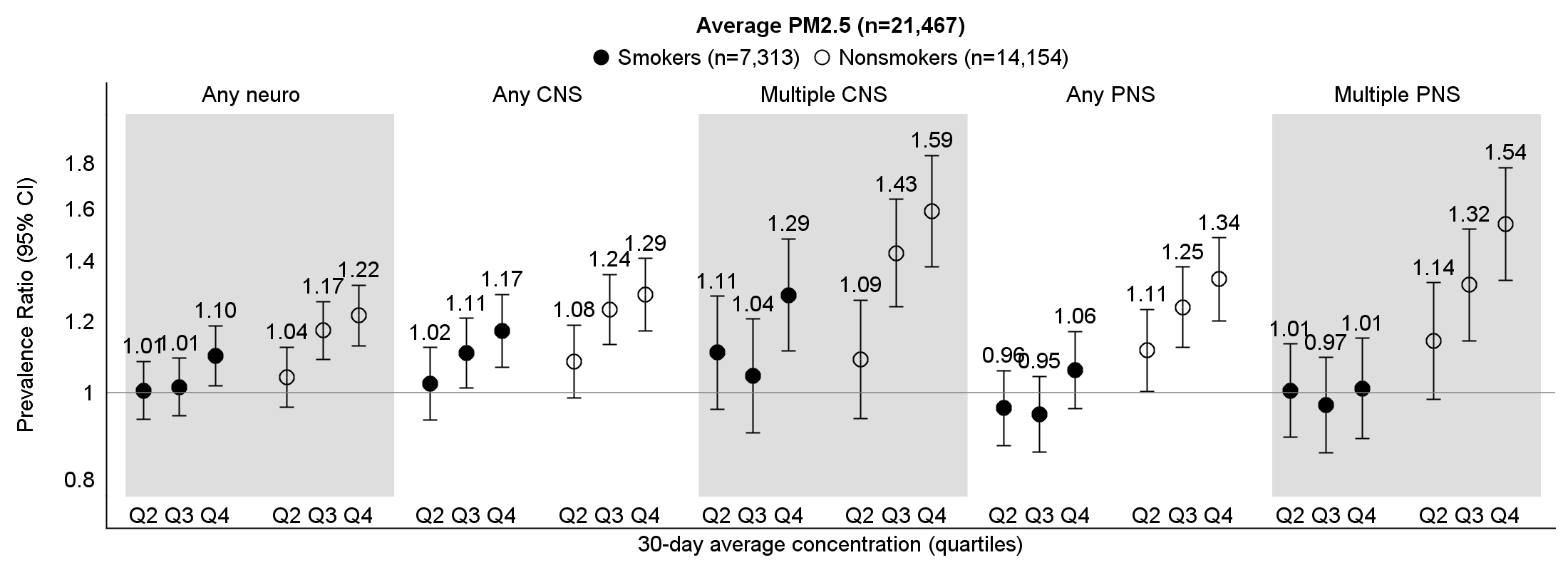
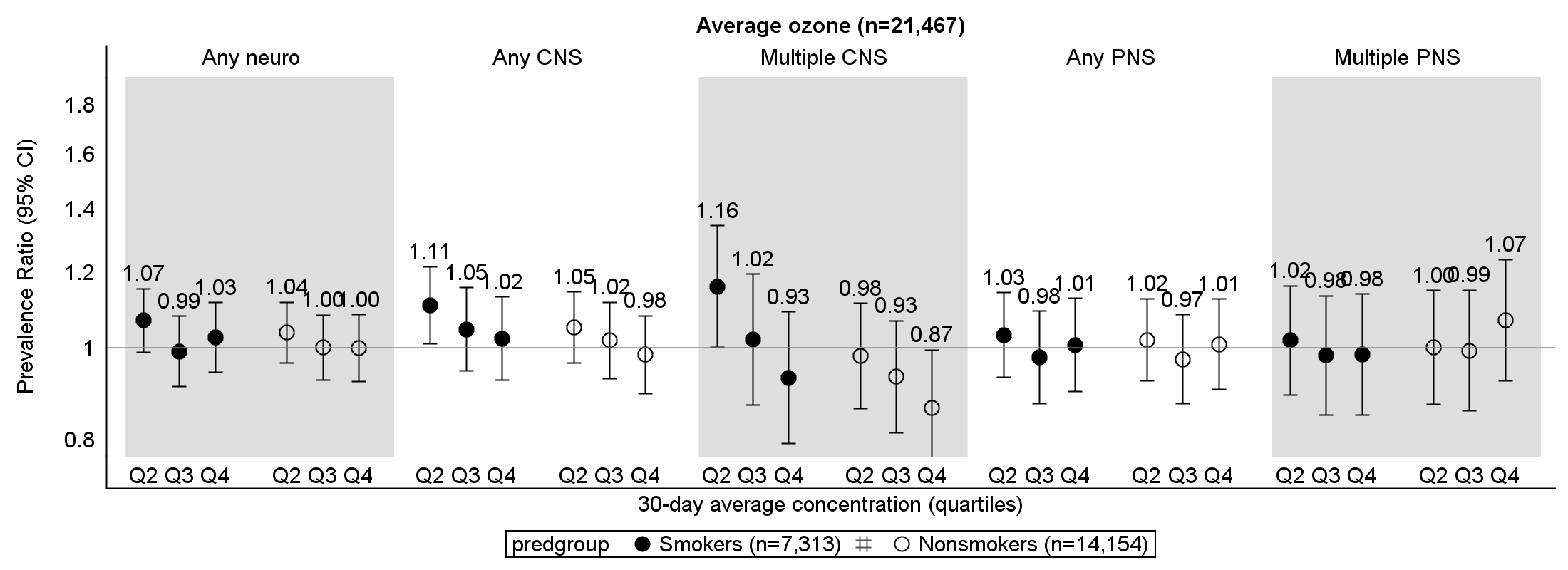
Supplemental Table 5. Associations between average ozone levels (quartiles of 30- and 7-day concentrations) and neurologic symptoms (n=21,467).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 30-day averageozone | | | | | | 7-day averageozone | | | | | |
|  |  | Covariate-adjusted1 | | | Covariate and  PM2.5-adjusted2 | | | Covariate-adjusted1 | | | Covariate and  PM2.5-adjusted3 | | |
| Outcome | Exposure | PR | 95% CI | p-trend | PR | 95% CI | p-trend | PR | 95% CI | p-trend | PR | 95% CI | p-trend |
| Any neuro | Q2 | 1.07 | (1.01, 1.13) | 0.02 | 1.05 | (1.00, 1.11) | 0.89 | 1.04 | (0.99, 1.10) | 0.10 | 1.04 | (0.99, 1.10) | 0.19 |
| Q3 | 1.04 | (0.98, 1.11) | | 1.00 | (0.93, 1.06) | | 1.03 | (0.98, 1.09) | | 1.03 | (0.97, 1.09) | |
|  | Q4 | 1.09 | (1.02, 1.16) | | 1.01 | (0.95, 1.08) | | 1.06 | (1.01, 1.12) | | 1.06 | (0.99, 1.13) | |
| Any CNS | Q2 | 1.09 | (1.02, 1.17) | 0.12 | 1.08 | (1.01, 1.15) | 0.20 | 1.09 | (1.03, 1.16) | 0.20 | 1.09 | (1.03, 1.16) | 0.62 |
|  | Q3 | 1.09 | (1.01, 1.18) | | 1.03 | (0.96, 1.11) | | 1.06 | (0.99, 1.13) | | 1.04 | (0.98, 1.12) | |
|  | Q4 | 1.11 | (1.03, 1.19) | | 1.00 | (0.93, 1.08) | | 1.09 | (1.02, 1.16) | | 1.06 | (0.98, 1.14) | |
| Multiple CNS | Q2 | 1.08 | (0.97, 1.19) | 0.91 | 1.05 | (0.95, 1.17) | 0.003 | 1.12 | (1.03, 1.23) | 0.35 | 1.11 | (1.02, 1.22) | 0.04 |
| Q3 | 1.06 | (0.94, 1.18) | | 0.97 | (0.86, 1.09) | | 1.04 | (0.94, 1.14) | | 1.00 | (0.91, 1.11) | |
|  | Q4 | 1.05 | (0.94, 1.18) | | 0.89 | (0.79, 1.00) | | 1.02 | (0.92, 1.13) | | 0.95 | (0.85, 1.06) | |
| Any PNS | Q2 | 1.04 | (0.96, 1.12) | 0.02 | 1.03 | (0.95, 1.11) | 0.77 | 1.03 | (0.97, 1.11) | 0.008 | 1.03 | (0.96, 1.10) | 0.03 |
|  | Q3 | 1.02 | (0.94. 1.11) | | 0.98 | (0.89, 1.06) | | 1.01 | (0.94, 1.09) | | 1.01 | (0.94, 1.09) | |
|  | Q4 | 1.09 | (1.01, 1.19) | | 1.01 | (0.92, 1.10) | | 1.10 | (1.02, 1.18) | | 1.09 | (1.00, 1.19) | |
| Multiple PNS | Q2 | 1.03 | (0.93, 1.13) | 0.01 | 1.01 | (0.92, 1.12) | 0.55 | 1.06 | (0.97, 1.16) | 0.003 | 1.06 | (0.97, 1.16) | 0.006 |
| Q3 | 1.04 | (0.93, 1.16) | | 0.99 | (0.88, 1.11) | | 1.04 | (0.94, 1.15) | | 1.04 | (0.94, 1.15) | |
|  | Q4 | 1.12 | (1.01, 1.26) | | 1.02 | (0.91, 1.15) | | 1.16 | (1.05, 1.28) | | 1.17 | (1.04, 1.30) | |

1Adjusted for age, sex, season, race, employment status, alcohol status, smoking status, education, income, and ADI

2Adjusted as in (1) and additionally adjusted for quartiles of 30-day average PM2.5 concentration

3Adjusted as in (1) and additionally adjusted for quartiles of 7-day average PM2.5 concentration

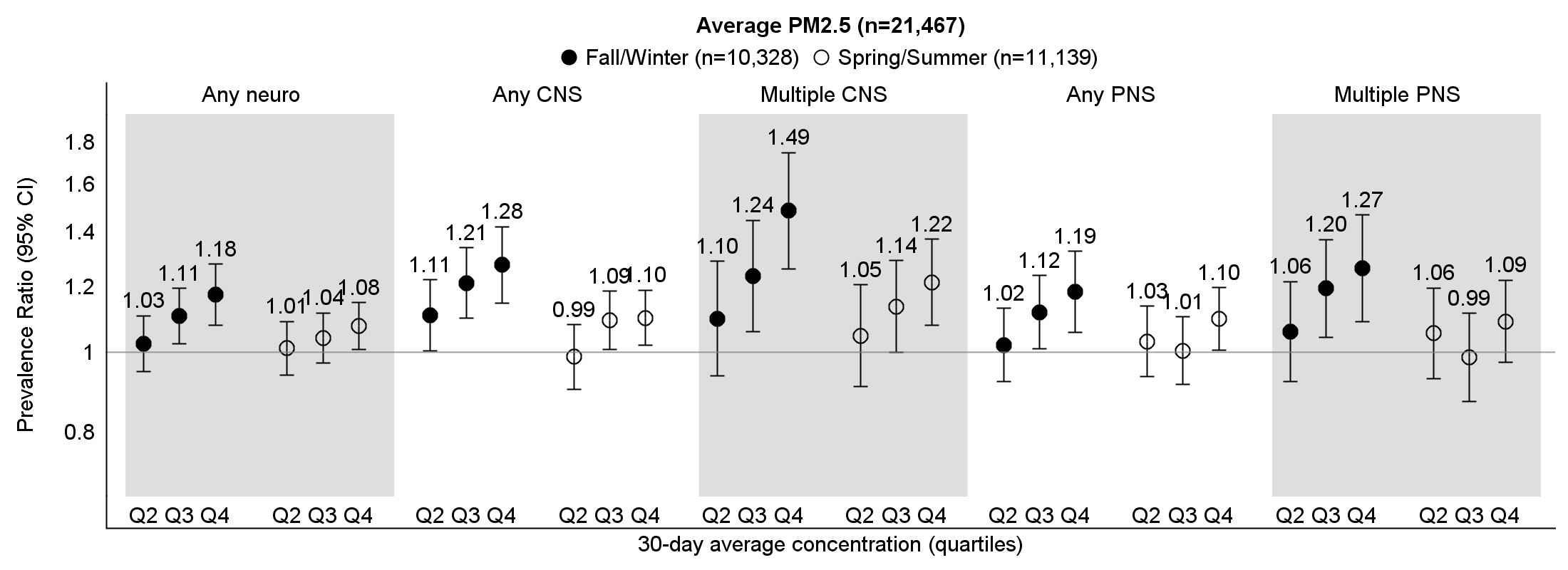
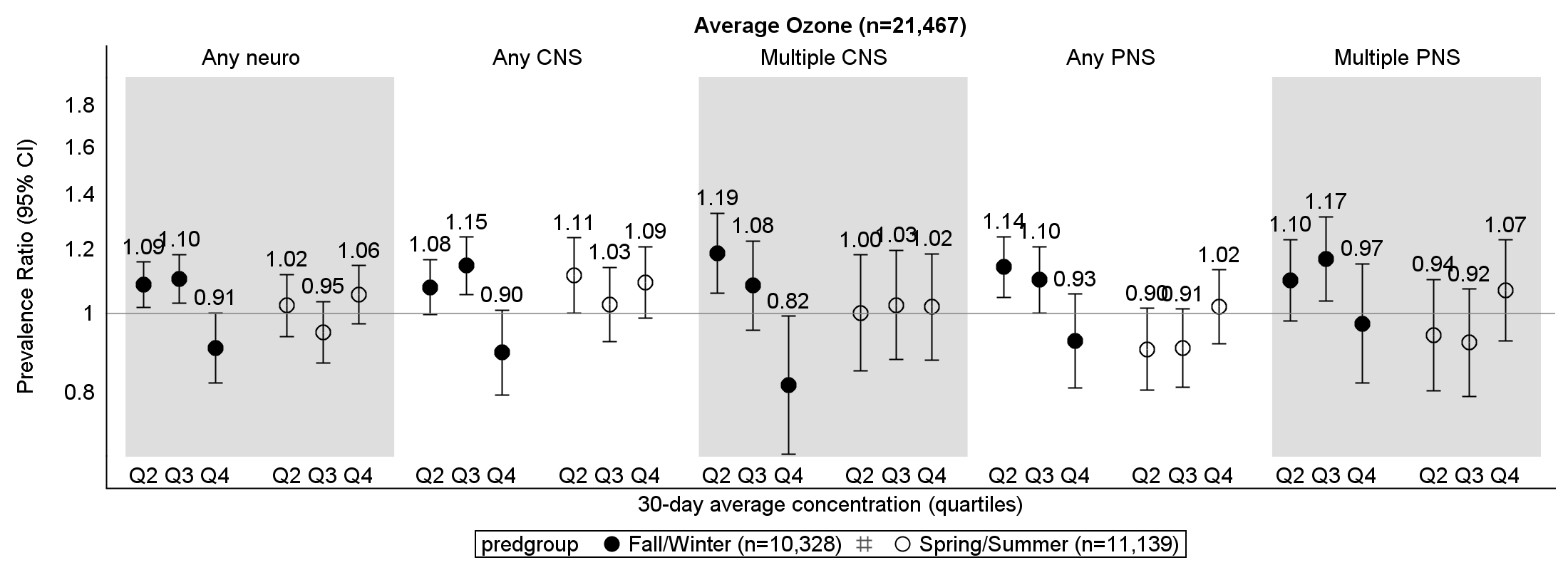
 

Supplemental Figure 2. Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by smoking status. Estimates are generated from co-pollutant models (including both PM2.5 and ozone: quartiles of 30-day average concentrations) with a product interaction term between the main exposure (PM2.5 or ozone) and smoking status, and adjusted for age, sex, season, race, employment status, alcohol status, smoking status, education, income, and ADI.

Supplemental Table 6 (accompanies Supplemental Figure 1). Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by smoking status (n=21,467).

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 30-day average PM2.5 | | | | | 30-day average ozone | | | | |
|  |  | Nonsmokers | | Smokers | |  | Nonsmokers | | Smokers | |  |
| Outcome | Level | PR | 95% CI | PR | 95% CI | p-interaction | PR | 95% CI | PR | 95% CI | p- interaction |
| Any neuro | Q2 | 1.04 | (0.96, 1.12) | 1.01 | (0.93, 1.08) | **0.02** | 1.04 | (0.97, 1.12) | 1.07 | (0.99, 1.16) | 0.83 |
|  | Q3 | 1.17 | (1.09, 1.26) | 1.01 | (0.94, 1.09) |  | 1.00 | (0.92, 1.08) | 0.99 | (0.91, 1.08) |  |
|  | Q4 | 1.22 | (1.13, 1.32) | 1.10 | (1.02, 1.19) |  | 1.00 | (0.92, 1.08) | 1.03 | (0.94, 1.12) |  |
| Any CNS | Q2 | 1.08 | (0.99, 1.19) | 1.02 | (0.93, 1.12) | 0.3 | 1.05 | (0.96, 1.15) | 1.11 | (1.01, 1.22) | 0.84 |
|  | Q3 | 1.24 | (1.13, 1.35) | 1.11 | (1.01, 1.21) |  | 1.02 | (0.93, 1.12) | 1.05 | (0.95, 1.16) |  |
|  | Q4 | 1.29 | (1.17, 1.41) | 1.17 | (1.07, 1.29) |  | 0.98 | (0.90, 1.08) | 1.02 | (0.92, 1.13) |  |
| Multiple CNS | Q2 | 1.09 | (0.94, 1.27) | 1.11 | (0.96, 1.28) | **0.0003** | 0.98 | (0.86, 1.11) | 1.16 | (1.00, 1.35) | 0.35 |
|  | Q3 | 1.43 | (1.25, 1.64) | 1.04 | (0.90, 1.21) |  | 0.93 | (0.81, 1.07) | 1.02 | (0.87, 1.20) |  |
|  | Q4 | 1.59 | (1.38, 1.84) | 1.29 | (1.11, 1.48) |  | 0.87 | (0.75, 1.00) | 0.93 | (0.79, 1.09) |  |
| Any PNS | Q2 | 1.11 | (1.00, 1.24) | 0.96 | (0.87, 1.06) | **0.0004** | 1.02 | (0.92, 1.13) | 1.03 | (0.93, 1.14) | 1.0 |
|  | Q3 | 1.25 | (1.13, 1.38) | 0.95 | (0.86, 1.04) |  | 0.97 | (0.87, 1.08) | 0.98 | (0.87, 1.09) |  |
|  | Q4 | 1.34 | (1.20, 1.49) | 1.06 | (0.96, 1.17) |  | 1.01 | (0.90, 1.13) | 1.01 | (0.90, 1.13) |  |
| Multiple PNS | Q2 | 1.14 | (0.98, 1.33) | 1.01 | (0.89, 1.13) | **<.0001** | 1.00 | (0.87, 1.15) | 1.02 | (0.89, 1.16) | 0.63 |
|  | Q3 | 1.32 | (1.14, 1.52) | 0.97 | (0.86, 1.10) |  | 0.99 | (0.86, 1.15) | 0.98 | (0.85, 1.13) |  |
|  | Q4 | 1.54 | (1.33, 1.78) | 1.01 | (0.89, 1.15) |  | 1.07 | (0.92, 1.24) | 0.98 | (0.85, 1.14) |  |

Estimates are generated from co-pollutant models (including both PM2.5 and ozone: quartiles of 30-day average concentrations) with a product interaction term between the main exposure (PM2.5 or ozone) and smoking status, and adjusted for age, sex, season, race, employment status, alcohol status, smoking status, education, income, and ADI.

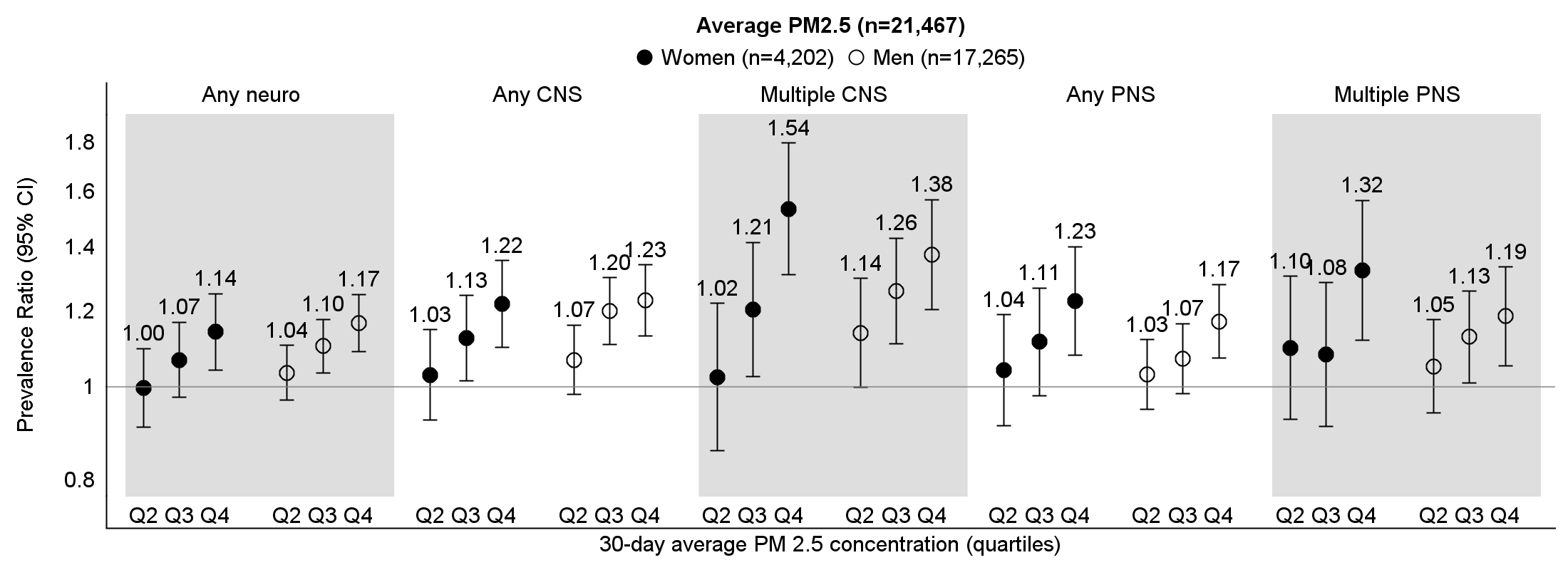
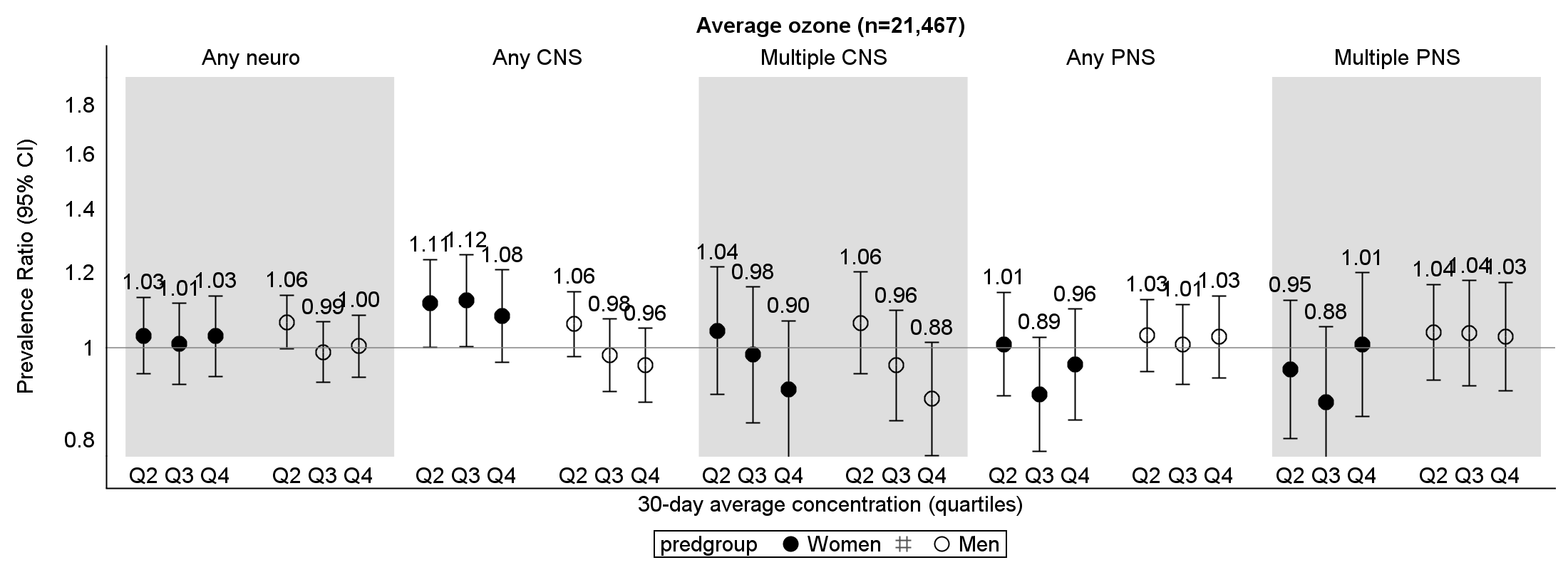
 

Supplemental Figure 3. Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by season. Estimates are generated from co-pollutant models (including both PM2.5 and ozone: quartiles of 30-day average concentrations) with a product interaction term between the main exposure (PM2.5 or ozone) and season (spring/summer or fall/winter), and adjusted for age, sex, individual season, race, employment status, alcohol status, smoking status, education, income, and ADI.

Supplemental Table 7 (accompanies Supplemental Figure 2). Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by season (n=21,467).

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 30-day average PM2.5 | | | | | 30-day average ozone | | | | |
|  |  | Fall/Winter | | Spring/Summer | |  | Fall/Winter | | Spring/Summer | |  |
| Outcome | Level | PR | 95% CI | PR | 95% CI | p-interaction | PR | 95% CI | PR | 95% CI | p-interaction |
| Any neuro | Q2 | 1.03 | (0.95, 1.11) | 1.01 | (0.94, 1.09) | 0.29 | 1.09 | (1.02, 1.16) | 1.02 | (0.94, 1.12) | **<.0001** |
|  | Q3 | 1.11 | (1.03, 1.20) | 1.04 | (0.97, 1.12) |  | 1.10 | (1.03, 1.18) | 0.95 | (0.87, 1.03) |  |
|  | Q4 | 1.18 | (1.08, 1.28) | 1.08 | (1.01, 1.15) |  | 0.91 | (0.82, 1.00) | 1.06 | (0.97, 1.15) |  |
| Any CNS | Q2 | 1.11 | (1.00, 1.23) | 0.99 | (0.90, 1.08) | 0.14 | 1.08 | (1.00, 1.17) | 1.11 | (1.00, 1.24) | **0.0001** |
|  | Q3 | 1.21 | (1.10, 1.34) | 1.09 | (1.01, 1.19) |  | 1.15 | (1.06, 1.24) | 1.03 | (0.92, 1.14) |  |
|  | Q4 | 1.28 | (1.15, 1.42) | 1.1 | (1.02, 1.19) |  | 0.9 | (0.79, 1.01) | 1.09 | (0.99, 1.21) |  |
| Multiple CNS | Q2 | 1.1 | (0.94, 1.29) | 1.05 | (0.91, 1.21) | 0.15 | 1.19 | (1.06, 1.33) | 1 | (0.85, 1.18) | **0.003** |
|  | Q3 | 1.24 | (1.06, 1.45) | 1.14 | (1.00, 1.29) |  | 1.08 | (0.95, 1.23) | 1.03 | (0.88, 1.20) |  |
|  | Q4 | 1.49 | (1.26, 1.75) | 1.22 | (1.08, 1.37) |  | 0.82 | (0.67, 0.99) | 1.02 | (0.88, 1.18) |  |
| Any PNS | Q2 | 1.02 | (0.92, 1.13) | 1.03 | (0.94, 1.14) | 0.23 | 1.14 | (1.05, 1.24) | 0.9 | (0.81, 1.02) | **<.0001** |
|  | Q3 | 1.12 | (1.01, 1.24) | 1.01 | (0.92, 1.10) |  | 1.1 | (1.00, 1.21) | 0.91 | (0.81, 1.01) |  |
|  | Q4 | 1.19 | (1.06, 1.33) | 1.1 | (1.01, 1.20) |  | 0.93 | (0.81, 1.06) | 1.02 | (0.92, 1.13) |  |
| Multiple PNS | Q2 | 1.06 | (0.92, 1.22) | 1.06 | (0.93, 1.20) | 0.06 | 1.1 | (0.98, 1.23) | 0.94 | (0.80, 1.10) | **0.003** |
|  | Q3 | 1.2 | (1.04, 1.37) | 0.99 | (0.87, 1.12) |  | 1.17 | (1.04, 1.32) | 0.92 | (0.79, 1.07) |  |
|  | Q4 | 1.27 | (1.09, 1.47) | 1.09 | (0.97, 1.22) |  | 0.97 | (0.82, 1.15) | 1.07 | (0.93, 1.23) |  |

Estimates are generated from co-pollutant models (including both PM2.5 and ozone: quartiles of 30-day average concentrations) with a product interaction term between the main exposure (PM2.5 or ozone) and season (spring/summer or fall/winter), and adjusted for age, sex, individual season, race, employment status, alcohol status, smoking status, education, income, and ADI.

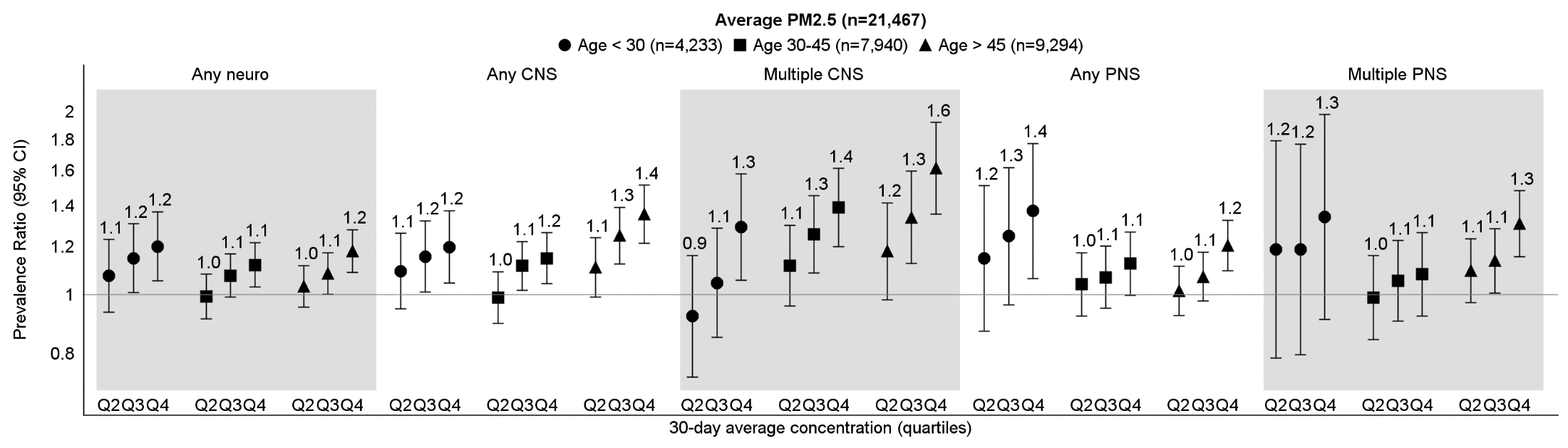
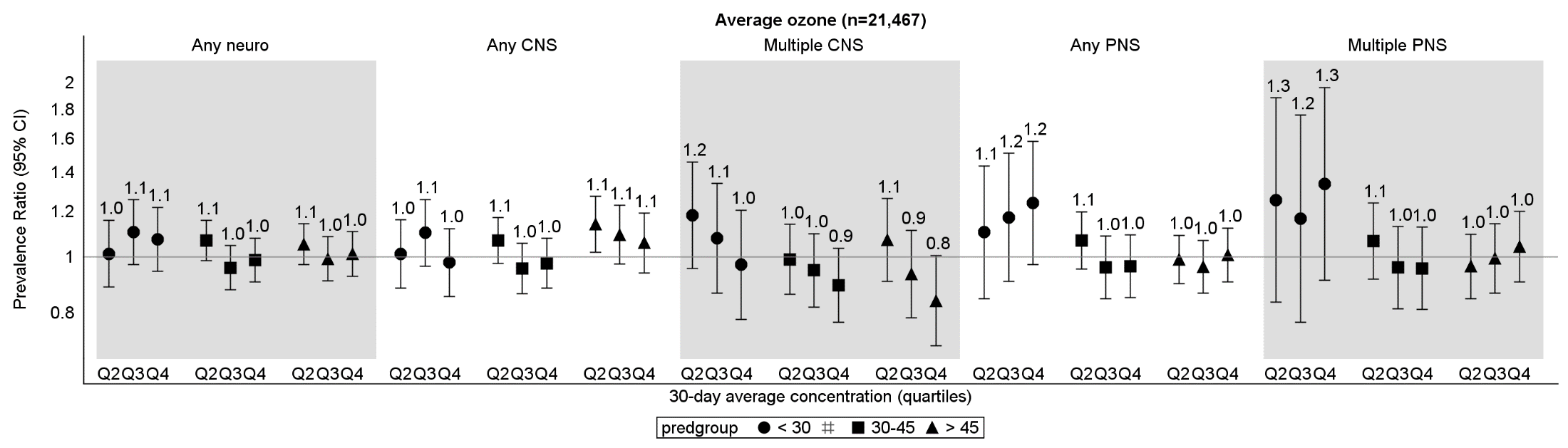
 

Supplemental Figure 4. Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by sex. Estimates are generated from co-pollutant models (including both PM2.5 and ozone: quartiles of 30-day average concentrations) with a product interaction term between the main exposure (PM2.5 or ozone) and sex, and adjusted for age, sex, season, race, employment status, alcohol status, smoking status, education, income, and ADI.

Supplemental Table 8 (accompanies Supplemental Figure 3). Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by sex (n=21,467).

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 30-day average PM2.5 | | | | | 30-day average ozone | | | | |
|  |  | Men | | Women | |  | Men | | Women | |  |
| Outcome | Level | PR | 95% CI | PR | 95% CI | p-interaction | PR | 95% CI | PR | 95% CI | p-interaction |
| Any neuro | Q2 | 1.04 | (0.97, 1.11) | 1 | (0.91, 1.10) | 0.92 | 1.06 | (1.00, 1.14) | 1.03 | (0.94, 1.13) | 0.68 |
|  | Q3 | 1.07 | (1.03, 1.18) | 1.07 | (0.98, 1.17) |  | 0.99 | (0.92, 1.07) | 1.01 | (0.92, 1.11) |  |
|  | Q4 | 1.14 | (1.09, 1.25) | 1.14 | (1.04, 1.25) |  | 1 | (0.93, 1.08) | 1.03 | (0.93, 1.13) |  |
| Any CNS | Q2 | 1.07 | (0.98, 1.16) | 1.03 | (0.92, 1.15) | 0.68 | 1.06 | (0.98, 1.15) | 1.11 | (1.00, 1.24) | 0.12 |
|  | Q3 | 1.2 | (1.11, 1.30) | 1.13 | (1.02, 1.25) |  | 0.98 | (0.90, 1.07) | 1.12 | (1.00, 1.25) |  |
|  | Q4 | 1.23 | (1.13, 1.34) | 1.22 | (1.10, 1.36) |  | 0.96 | (0.88, 1.05) | 1.08 | (0.97, 1.21) |  |
| Multiple CNS | Q2 | 1.14 | (1.00, 1.30) | 1.02 | (0.86, 1.22) | 0.07 | 1.06 | (0.94, 1.20) | 1.04 | (0.89, 1.22) | 0.95 |
|  | Q3 | 1.26 | (1.11, 1.43) | 1.21 | (1.03, 1.42) |  | 0.96 | (0.84, 1.10) | 0.98 | (0.83, 1.16) |  |
|  | Q4 | 1.38 | (1.21, 1.57) | 1.54 | (1.31, 1.80) |  | 0.88 | (0.77, 1.01) | 0.9 | (0.77, 1.07) |  |
| Any PNS | Q2 | 1.03 | (0.95, 1.12) | 1.04 | (0.91, 1.19) | 0.89 | 1.03 | (0.94, 1.13) | 1.01 | (0.89, 1.14) | 0.38 |
|  | Q3 | 1.07 | (0.99, 1.17) | 1.11 | (0.98, 1.27) |  | 1.01 | (0.92, 1.11) | 0.89 | (0.78, 1.03) |  |
|  | Q4 | 1.17 | (1.07, 1.28) | 1.23 | (1.08, 1.40) |  | 1.03 | (0.93, 1.13) | 0.96 | (0.84, 1.10) |  |
| Multiple PNS | Q2 | 1.05 | (0.94, 1.18) | 1.1 | (0.92, 1.31) | 0.34 | 1.04 | (0.92, 1.17) | 0.95 | (0.80, 1.12) | 0.28 |
|  | Q3 | 1.13 | (1.01, 1.26) | 1.08 | (0.91, 1.29) |  | 1.04 | (0.91, 1.18) | 0.88 | (0.73, 1.05) |  |
|  | Q4 | 1.19 | (1.05, 1.33) | 1.32 | (1.12, 1.57) |  | 1.03 | (0.90, 1.17) | 1.01 | (0.85, 1.20) |  |

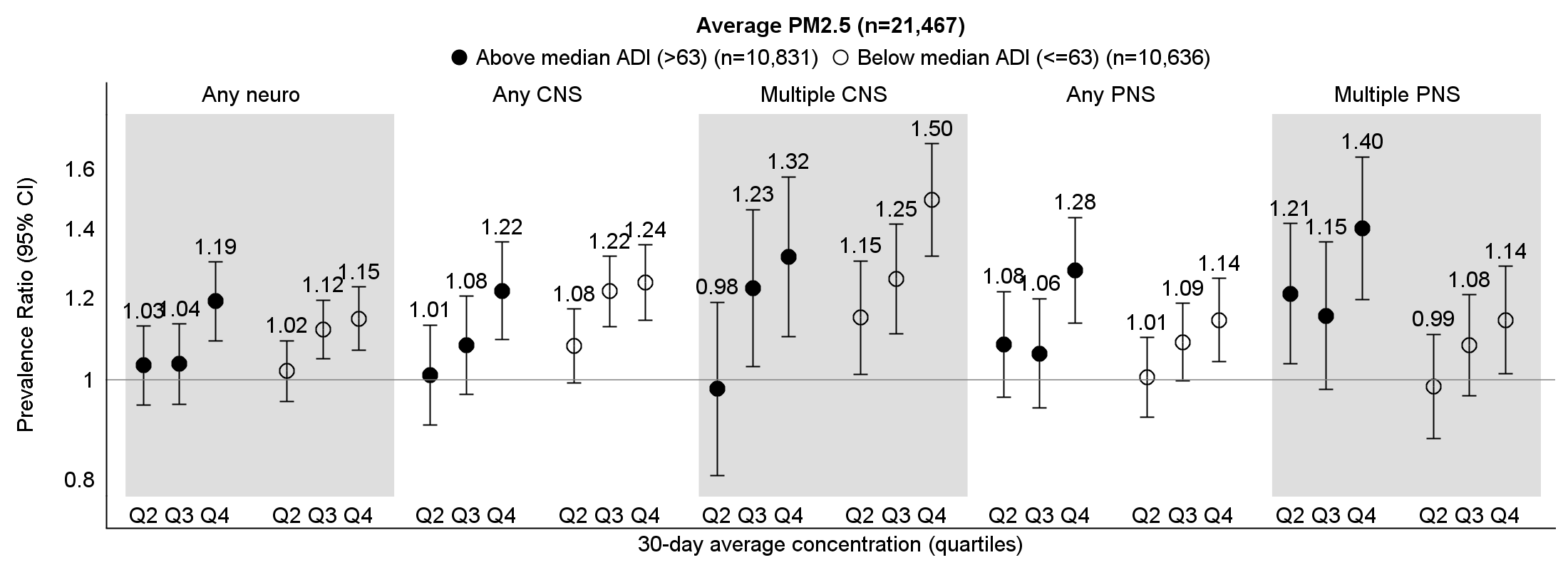
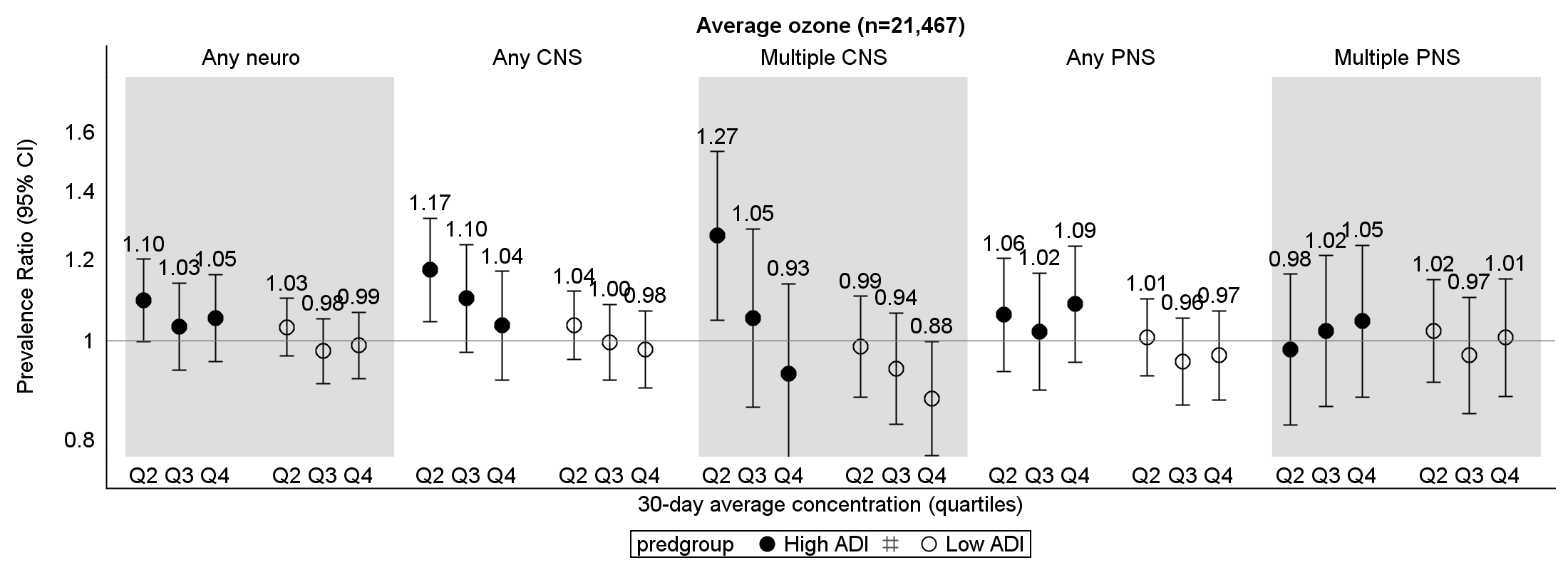
Estimates are generated from co-pollutant models (including both PM2.5 and ozone: quartiles of 30-day average concentrations) with a product interaction term between the main exposure (PM2.5 or ozone) and sex, and adjusted for age, sex, season, race, employment status, alcohol status, smoking status, education, income, and ADI.

Supplemental Figure 5. Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by age group. Estimates are generated from co-pollutant models (including both PM2.5 and ozone: quartiles of 30-day average concentrations) with a product interaction term between the main exposure (PM2.5 or ozone) and age group, and adjusted for age group, sex, season, race, employment status, alcohol status, smoking status, education, income, and ADI.

Supplemental Table 9 (accompanies Supplemental Figure 4). Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by age group (n=21,467).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Age <30 | | Age 30-45 | | Age >45 | | p-interaction |
| Exposure | Outcome | Level | PR | 95% CI | PR | 95% CI | PR | 95% CI |
| PM2.5 | Any neuro | Q2 | 1.08 | (0.94, 1.23) | 0.99 | (0.91, 1.08) | 1.03 | (0.95, 1.12) | 0.91 |
|  |  | Q3 | 1.15 | (1.01, 1.31) | 1.08 | (0.99, 1.17) | 1.08 | (1.00, 1.17) |  |
|  |  | Q4 | 1.2 | (1.05, 1.37) | 1.12 | (1.03, 1.22) | 1.12 | (1.09, 1.28) |  |
|  | Any CNS | Q2 | 1.09 | (0.95, 1.26) | 0.99 | (0.90, 1.09) | 1.11 | (0.99, 1.24) | 0.29 |
|  |  | Q3 | 1.16 | (1.01, 1.32) | 1.12 | (1.02, 1.22) | 1.23 | (1.12, 1.39) |  |
|  |  | Q4 | 1.2 | (1.04, 1.38) | 1.15 | (1.04, 1.27) | 1.36 | (1.22, 1.52) |  |
|  | Multiple CNS | Q2 | 0.92 | (0.73, 1.16) | 1.12 | (0.96, 1.30) | 1.18 | (0.98, 1.42) | 0.42 |
|  |  | Q3 | 1.05 | (0.85, 1.29) | 1.26 | (1.09, 1.46) | 1.34 | (1.13, 1.60) |  |
|  |  | Q4 | 1.29 | (1.06, 1.58) | 1.39 | (1.20, 1.62) | 1.62 | (1.36, 1.92) |  |
|  | Any PNS | Q2 | 1.15 | (0.87, 1.51) | 1.04 | (0.92, 1.17) | 1.01 | (0.92, 1.11) | 0.69 |
|  |  | Q3 | 1.25 | (0.96, 1.62) | 1.07 | (0.95, 1.20) | 1.07 | (0.98, 1.18) |  |
|  |  | Q4 | 1.37 | (1.06, 1.78) | 1.13 | (1.00, 1.27) | 1.21 | (1.10, 1.33) |  |
|  | Multiple PNS | Q2 | 1.19 | (0.79, 1.79) | 0.99 | (0.84, 1.16) | 1.1 | (0.97, 1.24) | 0.57 |
|  |  | Q3 | 1.19 | (0.80, 1.77) | 1.05 | (0.90, 1.23) | 1.14 | (1.01, 1.28) |  |
|  |  | Q4 | 1.34 | (0.91, 1.98) | 1.08 | (0.92, 1.27) | 1.31 | (1.16, 1.48) |  |
| Ozone | Any neuro | Q2 | 1.01 | (0.89, 1.16) | 1.07 | (0.99, 1.16) | 1.05 | (0.97, 1.14) | 0.21 |
|  |  | Q3 | 1.1 | (0.97, 1.26) | 0.96 | (0.88, 1.05) | 0.99 | (0.91, 1.08) |  |
|  |  | Q4 | 1.07 | (0.94, 1.22) | 0.99 | (0.91, 1.08) | 1.01 | (0.93, 1.11) |  |
|  | Any CNS | Q2 | 1.01 | (0.88, 1.16) | 1.07 | (0.98, 1.17) | 1.14 | (1.02, 1.27) | 0.14 |
|  |  | Q3 | 1.1 | (0.97, 1.26) | 0.96 | (0.86, 1.06) | 1.09 | (0.97, 1.23) |  |
|  |  | Q4 | 0.98 | (0.86, 1.12) | 0.98 | (0.88, 1.08) | 1.06 | (0.94, 1.19) |  |
|  | Multiple CNS | Q2 | 1.18 | (0.96, 1.46) | 0.99 | (0.86, 1.14) | 1.07 | (0.91, 1.26) | 0.68 |
|  |  | Q3 | 1.08 | (0.87, 1.34) | 0.95 | (0.82, 1.10) | 0.93 | (0.78, 1.11) |  |
|  |  | Q4 | 0.97 | (0.78, 1.21) | 0.89 | (0.77, 1.04) | 0.84 | (0.70, 1.01) |  |
|  | Any PNS | Q2 | 1.1 | (0.85, 1.44) | 1.07 | (0.95, 1.20) | 0.99 | (0.90, 1.09) | 0.27 |
|  |  | Q3 | 1.17 | (0.91, 1.51) | 0.96 | (0.85, 1.09) | 0.96 | (0.87, 1.07) |  |
|  |  | Q4 | 1.24 | (0.97, 1.59) | 0.96 | (0.85, 1.09) | 1.01 | (0.91, 1.12) |  |
|  | Multiple PNS | Q2 | 1.26 | (0.84, 1.89) | 1.07 | (0.92, 1.24) | 0.96 | (0.85, 1.10) | 0.33 |
|  |  | Q3 | 1.17 | (0.77, 1.76) | 0.96 | (0.81, 1.13) | 1 | (0.87, 1.14) |  |
|  |  | Q4 | 1.34 | (0.91, 1.96) | 0.96 | (0.81, 1.13) | 1.04 | (0.91, 1.20) |  |

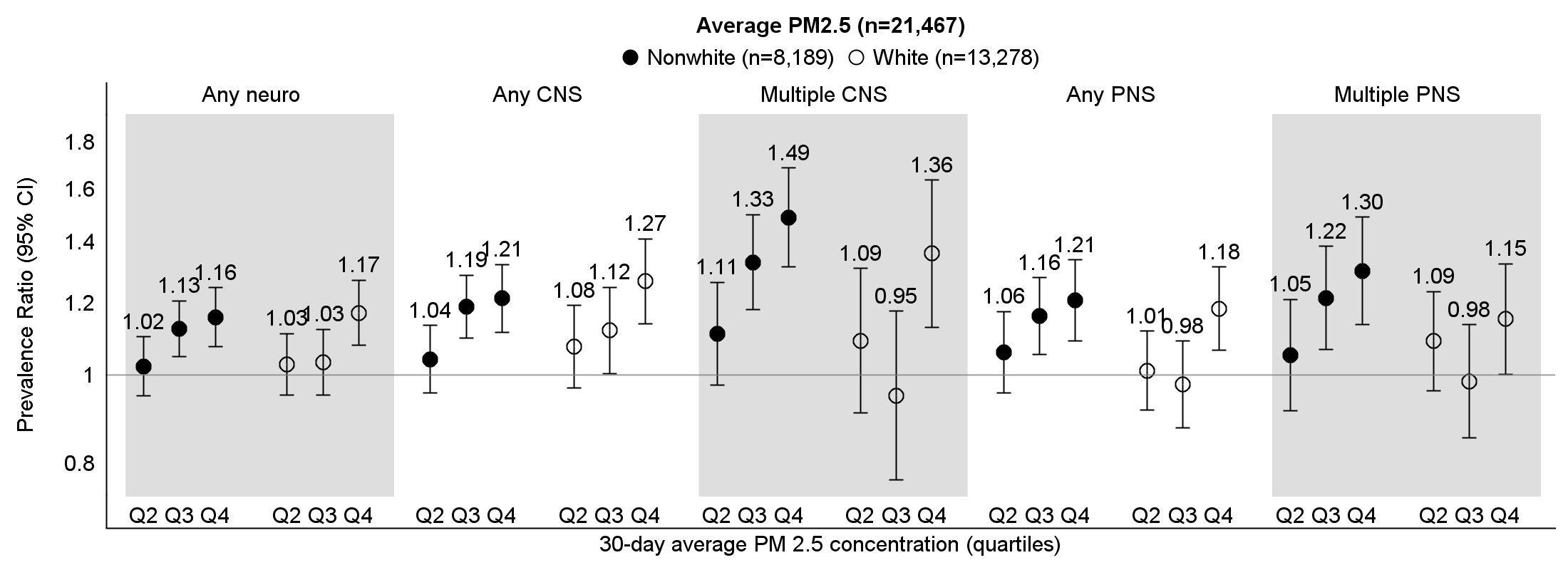
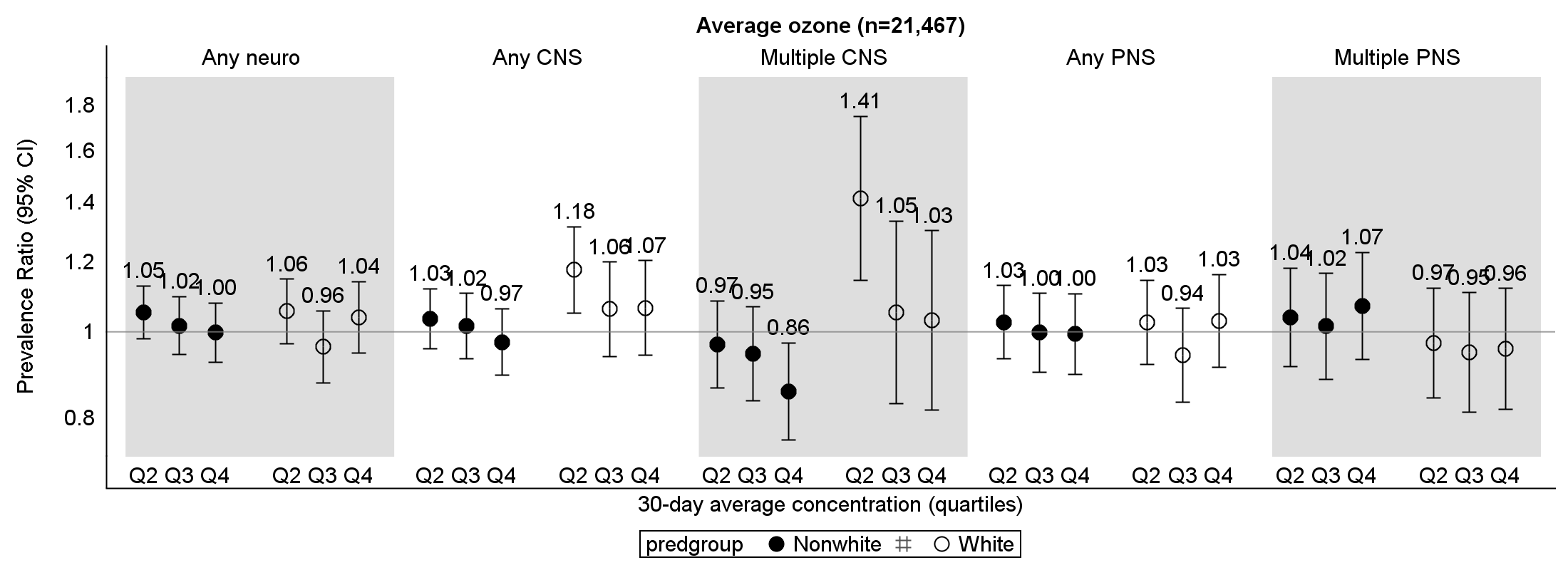
 

Supplemental Figure 6. Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by ADI(cohort median=63). Estimates are generated from co-pollutant models (including both PM2.5 and ozone: quartiles of 30-day average concentrations) with a product interaction term between the main exposure (PM2.5 or ozone) and ADI relative to the median (high vs low), and adjusted for age, sex, season, race, employment status, alcohol status, smoking status, education, income, and ADI.

Supplemental Table 10 (accompanies Supplemental Figure 5). Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by ADI (n=21,467).

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 30-day average PM2.5 | | | | | 30-day average ozone | | | | |
|  |  | High ADI | | Low ADI | | p-interaction | High ADI | | Low ADI | | p-interaction |
| Outcome | Level | PR | 95% CI | PR | 95% CI | PR | 95% CI | PR | 95% CI |
| Any neuro | Q2 | 1.03 | (0.95, 1.13) | 1.02 | (0.95, 1.09) | 0.13 | 1.1 | (1.00, 1.20) | 1.03 | (0.97, 1.10) | 0.64 |
|  | Q3 | 1.04 | (0.95, 1.13) | 1.12 | (1.05, 1.20) |  | 1.03 | (0.94, 1.14) | 0.98 | (0.91, 1.05) |  |
|  | Q4 | 1.19 | (1.09, 1.30) | 1.15 | (1.07, 1.23) |  | 1.05 | (0.95, 1.16) | 0.99 | (0.92, 1.07) |  |
| Any CNS | Q2 | 1.01 | (0.90, 1.13) | 1.08 | (0.99, 1.17) | 0.22 | 1.17 | (1.04, 1.32) | 1.04 | (0.96, 1.12) | 0.27 |
|  | Q3 | 1.08 | (0.97, 1.21) | 1.22 | (1.13, 1.32) |  | 1.1 | (0.98, 1.24) | 1 | (0.92, 1.09) |  |
|  | Q4 | 1.22 | (1.10, 1.36) | 1.24 | (1.14, 1.35) |  | 1.04 | (0.92, 1.17) | 0.98 | (0.90, 1.07) |  |
| Multiple CNS | Q2 | 0.98 | (0.81, 1.19) | 1.15 | (1.01, 1.30) | 0.35 | 1.27 | (1.05, 1.53) | 0.99 | (0.88, 1.11) | 0.09 |
|  | Q3 | 1.23 | (1.03, 1.46) | 1.25 | (1.11, 1.42) |  | 1.05 | (0.86, 1.29) | 0.94 | (0.83, 1.07) |  |
|  | Q4 | 1.32 | (1.10, 1.57) | 1.5 | (1.32, 1.70) |  | 0.93 | (0.76, 1.14) | 0.88 | (0.77, 1.00) |  |
| Any PNS | Q2 | 1.08 | (0.96, 1.22) | 1.01 | (0.92, 1.10) | 0.16 | 1.06 | (0.93, 1.20) | 1.01 | (0.92, 1.10) | 0.43 |
|  | Q3 | 1.06 | (0.94, 1.20) | 1.09 | (1.00, 1.19) |  | 1.02 | (0.89, 1.17) | 0.96 | (0.87, 1.05) |  |
|  | Q4 | 1.28 | (1.14, 1.44) | 1.14 | (1.04, 1.25) |  | 1.09 | (0.95, 1.24) | 0.97 | (0.88, 1.07) |  |
| Multiple PNS | Q2 | 1.21 | (1.04, 1.42) | 0.99 | (0.88, 1.11) | 0.06 | 0.98 | (0.83, 1.16) | 1.02 | (0.91, 1.15) | 0.74 |
|  | Q3 | 1.15 | (0.98, 1.36) | 1.08 | (0.97, 1.21) |  | 1.02 | (0.86, 1.21) | 0.97 | (0.85, 1.10) |  |
|  | Q4 | 1.4 | (1.20, 1.65) | 1.14 | (1.01, 1.29) |  | 1.05 | (0.88, 1.24) | 1.01 | (0.88, 1.15) |  |

Estimates are generated from co-pollutant models (including both PM2.5 and ozone: quartiles of 30-day average concentrations) with a product interaction term between the main exposure (PM2.5 or ozone) and ADI relative to the median (63) (high vs low), and adjusted for age, sex, season, race, employment status, alcohol status, smoking status, education, income, and ADI (relative to the median).

  Supplemental Figure 7. Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by race. Estimates are generated from co-pollutant models (including both PM2.5 and ozone: quartiles of 30-day maximum concentrations) with a product interaction term between the main exposure (PM2.5 or ozone) and race (nonwhite vs white), and adjusted for age, sex, season, race, employment status, alcohol status, smoking status, education, income, and ADI.

Supplemental Table 11 (accompanies Supplemental Figure 6). Associations between 30-day average criteria air pollutant levels and neurologic symptoms stratified by race (n=21,467).

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 30-day average PM2.5 | | | | | 30-day average ozone | | | | |
|  |  | Nonwhite | | White | | p-interaction | Nonwhite | | White | | p-interaction |
| Outcome | Level | PR | 95% CI | PR | 95% CI | PR | 95% CI | PR | 95% CI |
| Any neuro | Q2 | 1.02 | (0.95, 1.10) | 1.03 | (0.95, 1.11) | 0.19 | 1.05 | (0.98, 1.13) | 1.06 | (0.97, 1.15) | 0.29 |
|  | Q3 | 1.13 | (1.05, 1.21) | 1.03 | (0.95, 1.12) |  | 1.02 | (0.94, 1.10) | 0.96 | (0.88, 1.06) |  |
|  | Q4 | 1.16 | (1.08, 1.25) | 1.17 | (1.08, 1.27) |  | 1.00 | (0.93, 1.08) | 1.04 | (0.95, 1.14) |  |
| Any CNS | Q2 | 1.04 | (0.96, 1.13) | 1.08 | (0.97, 1.19) | 0.34 | 1.03 | (0.96, 1.12) | 1.18 | (1.05, 1.32) | 0.24 |
|  | Q3 | 1.19 | (1.10, 1.29) | 1.12 | (1.00, 1.25) |  | 1.02 | (0.93, 1.11) | 1.06 | (0.94, 1.20) |  |
|  | Q4 | 1.21 | (1.12, 1.32) | 1.27 | (1.14, 1.41) |  | 0.97 | (0.89, 1.06) | 1.07 | (0.94, 1.20) |  |
| Multiple CNS | Q2 | 1.11 | (0.98, 1.27) | 1.09 | (0.91, 1.31) | **0.01** | 0.97 | (0.87, 1.08) | 1.41 | (1.14, 1.75) | **0.006** |
|  | Q3 | 1.33 | (1.18, 1.50) | 0.95 | (0.77, 1.18) |  | 0.95 | (0.84, 1.07) | 1.05 | (0.83, 1.33) |  |
|  | Q4 | 1.49 | (1.32, 1.69) | 1.36 | (1.13, 1.64) |  | 0.86 | (0.76, 0.97) | 1.03 | (0.82, 1.30) |  |
| Any PNS | Q2 | 1.06 | (0.96, 1.17) | 1.01 | (0.92, 1.12) | 0.06 | 1.03 | (0.93, 1.13) | 1.03 | (0.92, 1.14) | 0.55 |
|  | Q3 | 1.16 | (1.05, 1.28) | 0.98 | (0.88, 1.09) |  | 1.00 | (0.90, 1.11) | 0.94 | (0.83, 1.06) |  |
|  | Q4 | 1.21 | (1.09, 1.34) | 1.18 | (1.07, 1.31) |  | 1.00 | (0.90, 1.10) | 1.03 | (0.91, 1.16) |  |
| Multiple PNS | Q2 | 1.05 | (0.91, 1.21) | 1.09 | (0.96, 1.24) | **0.03** | 1.04 | (0.91, 1.18) | 0.97 | (0.84, 1.12) | 0.66 |
|  | Q3 | 1.22 | (1.07, 1.38) | 0.98 | (0.85, 1.14) |  | 1.02 | (0.89, 1.16) | 0.95 | (0.81, 1.11) |  |
|  | Q4 | 1.30 | (1.14, 1.49) | 1.15 | (1.00, 1.33) |  | 1.07 | (0.93, 1.23)) | 0.96 | (0.82, 1.12) |  |

Estimates are generated from co-pollutant models (including both PM2.5 and ozone: quartiles of 30-day maximum concentrations) with a product interaction term between the main exposure (PM2.5 or ozone) and race (nonwhite vs white), and adjusted for age, sex, season, race, employment status, alcohol status, smoking status, education, income, and ADI.