**Supplemental Material**

**Title:** Sleep Apnea Symptoms and Sleepiness Associate with Future Diet Quality in The Bogalusa Heart Study

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Figure S1. Participant flowchart.

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Description automatically generated with medium confidence**

Table S1. Berlin questionnaire for sleep apnea risk 1. Respondents considered to be high risk for sleep apnea if they score positive on two of the three categories.

|  |  |  |
| --- | --- | --- |
| **Category** | **Question (In the last 4 weeks)** | **Response options** |
| Category 1, **Snoring**: this category is positive if the sum of the 5 items is 2 or more | 1. Have you snored? | * Yes (1 point) * No * Don’t know |
| 1. Your snoring is: | * Slightly louder than breathing * As loud as talking (1 point) * Louder than talking (1 point) * Very loud-can be heard in adjacent rooms (1 point) |
| 1. How often do you snore? | * Almost every day (1 point) * 3-4 times/week (1 point) * 1-2 times/week * 1-2 times/month * Never |
| 1. Does your snoring bother other people? | * Yes (1 point) * No * Don’t know |
| 1. Has anyone ever noticed you stop breathing during your sleep? | * Almost every day (2 points) * 3-4 times/week (2 points) * 1-2 times/week * 1-2 times/month * Never |
| Category 2, **Sleepiness**: this category is positive if the sum is 2 or more | 1. How often do you feel tired or fatigued after you sleep? | * Almost every day (1 point) * 3-4 times/week (1 point) * 1-2 times/week * 1-2 times/month * Never |
| 1. During your waking time, do you feel tired, fatigued, or not up to par? | * Almost every day (1 point) * 3-4 times/week (1 point) * 1-2 times/week * 1-2 times/month * Never |
| 1. Have you ever nodded off or fallen asleep while driving? | * Yes (1 point) * No * Don’t know |
| Category 3, **Obesity/ Hypertension**: this category is positive if score is 1 or more | 1. Body Mass Index > 30 kg/m2? | * Yes (1 point) * No |
| 1. High blood pressure? | * Yes (1 point) * No |

Table S2. Components and scoring of dietary patterns Alternate Healthy Eating Index 2010 2, Healthy Eating Index-2015 3, and Alternate Mediterranean Diet Score 4.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Alternate Healthy Eating Index (AHEI) 2010** | | **Healthy Eating Index (HEI) 2015** | | **Alternate Mediterranean (aMed)** | |
| **Summary** | 11 components  Total score: 0-110 | Components score 0-10 between the criteria for min and max score. | 13 components  Total score: 0-100 | Components score 0-5 or 0-10 between the criteria for min and max score. | 9 components  Total score: 0-9 | Components score 0-1 based on sex-specific medians |
|  | **Component** | **Scoring** | **Component** | **Scoring** | **Component** | **Scoring** |
| Higher intake à higher score | 1. Fruits | 0: 0 servings  10: ≥ 4 servings | 1. Total fruits (including 100% juice) | 0: no fruit  5: ≥ 0.8 cup per 1000 kcal | 1. Fruit | 0: < median  1: > median |
| *1 serving =1 medium piece or 0.5 cup berries* | |
| 2. Vegetables (not potatoes) | 0: 0 servings  10: ≥ 5 servings | 2. Whole fruits | 0: no whole fruit  5: ≥ 0.4 cup per 1000 kcal | 2. Vegetables (not potatoes) | 0: < median  1: > median |
| *1 serving=0.5 cups vegetables or 1 cup greens* | |
| 3. Nuts and legumes | 0: 0 servings  10: ≥ 1 servings | 3. Total vegetables (incl. legumes) | 0: no vegetables  5: ≥ 1.1 cup per 1000 kcal | 3. Nuts | 0: < median  1: > median |
| *1 serving=1 oz nuts or 1 tbsp nut butter* | |
| 4. Whole grains | 0: 0 grams  10: men à ≥ 90 grams  women à ≥ 75 grams | 4. Greens and beans | 0: no dark greens or legumes  5: ≥ 0.2 cup per 1000 kcal | 4. Legumes | 0: < median  1: > median |
| 5. Long chain (n-3) fatty acids (EPA + DHA) | 0: 0 mg  10: ≥ 250 mg (~2-4 servings of fish per week) | 5. Whole grains | 0: no whole grains  10: ≥ 1.5 oz per 1000 kcal | 5. Whole grains | 0: < median  1: > median |
| 6. PUFAs | 0: ≤ 2% of energy  10: ≥ 10% of energy | 6. Dairy | 0: no diary  10: ≥ 1.3 cup per 1000 kcal | 6. Fish | 0: < median  1: > median |
|  |  | 7. Total protein foods | 0: no protein foods  5: ≥ 2.5 oz per 1000 kcal | 7. Fatty acids ratio: (MUFAs/ SFAs) | 0: < median  1: > median |
|  |  | 8. Seafood and plant proteins | 0: no seafood or plant proteins  5: ≥ 0.8 oz per 1000 kcal |  |  |
|  |  | 9. Fatty acids ratio | 0: (PUFAs + MUFAs) / SFAs ≤ 1.2  10: (PUFAs + MUFAs) / SFAs ≥ 2.5 |  |  |
| Lower intake à higher score | 7. Sugar sweetened beverages and fruit juice | 0: 0  10: ≥ 1 serving | 10. Refined grains | 0: ≥ 4.3 oz per 1000 kcal  10: ≤ 1.8 oz per 1000 kcal | 8. Red and processed meats | 0: > median  1: < median |
| *1 serving=8 oz* | |
| 8. Red and processed meats | 0: ≥ 1.5 servings  10: 0 servings | 11. Added sugars | 0: ≥ 26% of energy  10: ≤ 6.5% of energy |  |  |
| *1 serving=4 oz unprocessed meat or 1.5 oz processed meat* | |
| 9. *trans* fats | 0: ≥ 4% of energy  10: ≤ 0.5% of energy | 12. Saturated fats | 0: ≥ 16% of energy  10: ≤ 8% of energy |  |  |
| 10. Sodium | 0: highest decile  10: lowest decile | 13. Sodium | 0: ≥ 2.0 grams per 1000 kcal  10: ≤1.1 grams per 1000 kcal |  |  |
| Moderate intake à highest score | 11. Alcohol | 0: men à ≥ 3.5 drinks  women à ≥ 2.5 drinks  10: men à 0.5-2.0 drinks  women à0.5-1.5 drinks |  |  | 9. Alcohol | 0: men🡪 <10 or  >25 grams  women🡪 <5 or  >15 grams  1: men🡪10-25  grams  women🡪 5-15  grams |

All amounts are intakes per day unless otherwise specified. PUFA: polyunsaturated fatty acids. MUFA: monounsaturated fatty acids. SFA: saturated fatty acids.

Table S3. Comparison of baseline characteristics by quintile of Alternate Healthy Eating Index 2010 at follow-up.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | **Q1 a** | **Q3 a** | **Q5 a** | **p-value b** |
|  | | n=88 | n=89 | n=98 |  |
|  | ***Demographic characteristics at baseline (2007-2010)*** | | | | |
| Age in years | | 42.80 ± 4.38 | 43.51 ± 4.47 | 44.43 ± 3.93 | 0.044 |
| Male (%) | | 28.41 | 38.20 | 30.61 | 0.530 |
| Black persons (%) | | 19.32 | 40.45 | 26.53 | 0.038 |
| Education, high school or less (%) | | 42.05 | 44.94 | 33.67 | 0.177 |
| Income at baseline | |  |  |  |  |
| <$15,000 | | 19.32 | 30.34 | 19.39 | 0.118 |
| $15,000-$30,000 | | 23.86 | 12.36 | 12.24 |
| $30,000-$45,000 | | 12.50 | 13.48 | 11.22 |
| >$45,000 | | 44.32 | 43.82 | 57.14 |
| Employed (%) | | 67.05 | 64.04 | 64.29 | 0.969 |
| Has health insurance (%) | | 64.77 | 70.79 | 75.51 | 0.172 |
| Household size | | 3.30 ± 1.20 | 3.28 ± 1.38 | 3.18 ± 1.21 | 0.845 |
| Lives with spouse (%) | | 65.91 | 56.18 | 72.45 | 0.078 |
| Children in house (%) | | 76.14 | 70.79 | 68.37 | 0.628 |
|  | ***Neighborhood characteristics (census tract level, 2009 5-yr American Community Survey)*** | | | | |
| Total population (households) | | 1938.57 ± 628.77 | 1913.83 ± 849.25 | 2126.77 ± 727.46 | 0.195 |
| Median household income | | 32209.84 ± 11265.09 | 32356.39 ± 13736.66 | 34493.97 ± 15216.71 | 0.522 |
| % of households receiving food stamps | | 29.59 ± 9.26 | 30.16 ± 11.02 | 27.22 ± 9.67 | 0.134 |
| % of households with no vehicle | | 8.79 ± 6.04 | 10.62 ± 6.50 | 9.34 ± 6.11 | 0.409 |
| Index of Concentration at the Extremes | | -0.07 ± 0.16 | -0.13 ± 0.21 | -0.10 ± 0.22 | 0.341 |
| MRFEI | | 11.11 ± 9.45 | 11.35 ± 9.22 | 12.12 ± 9.04 | 0.950 |
|  | ***Health and lifestyle factors at baseline (2007-2010)*** | | | | |
| Smoking status (%) | |  |  |  |  |
| Never | | 61.36 | 62.92 | 65.31 | 0.628 |
| Former | | 13.64 | 10.11 | 15.31 |
| Current | | 25.00 | 26.97 | 19.39 |
| Current alcohol use (%) | |  |  |  |  |
| Non-drinker | | 38.64 | 38.20 | 21.43 | 0.027 |
| Occasional drinker | | 38.64 | 46.07 | 40.82 |
| Regular drinker | | 22.73 | 15.73 | 37.76 |
| Physically active at work (%) | | 34.09 | 26.97 | 26.53 | 0.487 |
| Physically active not at work (%) | | 19.32 | 28.09 | 28.57 | 0.621 |
| Depressive symptoms (%) | | 25.00 | 32.58 | 22.45 | 0.606 |
| CES-D score | | 11.11 ± 8.18 | 12.51 ± 11.02 | 10.50 ± 8.58 | 0.653 |
| Body mass index, kg/m2 | | 31.17 ± 7.59 | 31.06 ± 7.71 | 30.52 ± 9.01 | 0.912 |
| Obesity (%) | | 52.27 | 53.93 | 42.86 | 0.233 |
| Waist circumference, cm | | 99.27 ± 17.19 | 99.21 ± 16.05 | 97.49 ± 16.07 | 0.774 |
|  | ***Sleep apnea risk and symptoms at baseline (2007-2010)*** | | | | |
| High risk for sleep apnea (%) | | 44.32 | 39.33 | 36.73 | 0.524 |
| Excessive snoring (%) | | 42.05 | 44.94 | 38.78 | 0.579 |
| Excessive daytime sleepiness (%) | | 32.95 | 17.98 | 12.24 | 0.012 |
| a. Frequency (%) or mean ±SD among quintile (column total). (Quintiles 2 and 4 not shown for brevity).  b. p-value from ANOVA for continuous covariates and from Pearson chi-squared test for independence for categorical covariates comparing across all quintiles.  Physically active: self-rating of 4 or 5 (active or very active) on 5-point scale.  Index of Concentration at the Extremes: ([(number of White householders with >$100,000 annual income)-(number of Black householders with <$25,000 annual income)] / total households reporting income)  Occasional drinker: less than once a week; Regular drinker: once or twice a week, or more.  Depressive symptoms defined as CES-D ≥ 16.  Obesity defined as BMI ≥ 30 kg/m2.  High risk for sleep apnea: positive on two of three categories on the Berlin questionnaire.  Excessive snoring: loud (louder than talking) or frequent (>1-2 times/wk).  Excessive sleepiness: felling tired or not up to par during waking hours >1-2 times/wk. | | | | | |

Table S4. Comparison of baseline characteristics of those included to those lost to follow-up or excluded.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Included in the analysis a** | **Excluded or lost to follow-up a** | **p-value b** |
|  | n=445 | n=469 |  |
| ***Demographic characteristics at baseline (2007-2010)*** | | | |
| Age in years | 43.47 ± 4.37 | 43.62 ± 4.55 | 0.630 |
| Male (%) | 34.16 | 49.68 | <0.0001 |
| Black persons (%) | 28.76 | 34.62 | 0.058 |
| Education, high school or less (%) | 36.63 | 48.17 (n=438) | 0.001 |
| Income at baseline |  | (n=468) |  |
| <$15,000 | 19.78 | 31.20 | 0.001 |
| $15,000-$30,000 | 17.30 | 14.96 |
| $30,000-$45,000 | 12.36 | 11.54 |
| >$45,000 | 50.56 | 42.31 |
| Employed (%) | 65.17 | 59.28 | 0.066 |
| Has health insurance (%) | 72.58 | 63.68 (n=468) | 0.004 |
| Household size | 3.30 ± 1.29 | 3.22 ± 1.38 | 0.384 |
| Lives with spouse (%) | 67.19 | 60.13 | 0.027 |
| Children in house (%) | 71.91 | 62.05 | 0.002 |
| ***Neighborhood characteristics (census tract level, 2009 5-yr American Community Survey)*** | | | |
| Total population (households) | 2026.17 ± 783.82 | 2012.30 ± 778.69 (n=432) | 0.793 |
| Median household income | 33374.16 ± 13295.03 | 33838.90 ± 16409.78 (n=432) | 0.588 |
| % of households receiving food stamps | 28.69 ± 10.06 | 28.79 ± 10.31 (n=432) | 0.878 |
| % of households with no vehicle | 9.57 ± 6.30 | 9.66 ± 6.19 (n=432) | 0.833 |
| Index of Concentration at the Extremes | -0.10 ± 0.20 | -0.10 ± 0.20 (n=432) | 0.709 |
| MRFEI | 11.46 ± 9.20 | 11.83 ± 9.30 (n=432) | 0.553 |
| ***Health and lifestyle factors at baseline (2007-2010)*** | | | |
| Smoking status (%) |  |  |  |
| Never | 63.37 | 51.39 | 0.0002 |
| Former | 14.61 | 14.50 |
| Current | 22.02 | 34.12 |
| Current alcohol use (%) |  | (n=459) |  |
| Non-drinker | 34.61 | 39.87 | 0.006 |
| Occasional drinker | 40.00 | 29.85 |
| Regular drinker | 25.39 | 30.28 |
| Physically active at work (%) | 28.54 | 31.76 (n=466) | 0.290 |
| Physically active not at work (%) | 25.62 | 27.84 (n=467) | 0.449 |
| Depressive symptoms (%) | 26.29 | 31.83 (n=465) | 0.066 |
| CES-D score | 11.30 ± 9.27 | 13.34 ± 10.71 (n=465) | 0.002 |
| Body mass index, kg/m2 | 30.81 ± 7.78 | 31.12 ± 7.68 (n=467) | 0.549 |
| Obesity (%) | 47.87 | 49.46 | 0.629 |
| Waist circumference, cm | 98.66 ± 16.24 | 100.78 ± 17.84 (n=468) | 0.060 |
| ***Sleep apnea risk and symptoms at baseline (2007-2010)*** | | | |
| High risk for sleep apnea (%) | 39.33 | 42.00 | 0.410 |
| Excessive snoring (%) | 42.25 | 45.42 | 0.335 |
| Excessive daytime sleepiness (%) | 21.80 | 30.70 | 0.002 |
| ***Diet at follow-up (2013-2016)*** | | | |
| AHEI-2010 | 45.50 ± 9.74 | 44.43 ± 9.60 (n=73) | 0.385 |
| HEI-2015 | 59.69 ± 9.31 | 59.99 ± 9.11 (n=73) | 0.803 |
| aMed | 3.81 ± 1.72 | 3.71 ± 1.89 (n=73) | 0.669 |
| Total energy intake, kcal/d | 2195.30 ± 946.66 | 2289.38 ± 1089.38 (n=73) | 0.442 |
| a. Frequency (%) or mean ±SD among total sample.  b. p-value from t-test for continuous covariates and from Pearson chi-squared test for independence for categorical covariates.  AHEI: Alternative Healthy Eating Index. HEI: Healthy Eating Index. aMed: Alternate Mediterranean dietary pattern.  Physically active: self-rating of 4 or 5 (active or very active) on 5-point scale.  Index of Concentration at the Extremes: ([(number of White householders with >$100,000 annual income)-(number of Black householders with <$25,000 annual income)] / total households reporting income)  Occasional drinker: less than once a week; Regular drinker: once or twice a week, or more.  Depressive symptoms defined as CES-D ≥ 16.  Obesity defined as BMI ≥ 30 kg/m2.  High risk for sleep apnea: positive on two of three categories on the Berlin questionnaire.  Excessive snoring: loud (louder than talking) or frequent (≥ 3-4 times/wk) snoring.  Excessive sleepiness: felling tired or not up to par during waking hours ≥ 3-4 times/wk. | | | |

Table S5. P-values for interaction product terms from fully adjusted model to assess interaction by sex, race, and education in the associations between sleep apnea risk, snoring, and sleepiness with diet quality measures (AHEI, HEI, and aMed).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Exposure | Outcome |  | Sex \* exposure | Race \* exposure | Education \* exposure |
|  |  |  | Product-term p-value | Product-term p-value | Product-term p-value |
| High risk for sleep apnea | AHEI |  | 0.255 | 0.093 | 0.963 |
| HEI |  | 0.488 | 0.566 | 0.325 |
| aMed |  | 0.832 | 0.067 | 0.925 |
| Excessive snoring | AHEI |  | 0.284 | 0.473 | 0.961 |
| HEI |  | 0.825 | 0.218 | 0.335 |
| aMed |  | 0.368 | 0.244 | 0.491 |
| Excessive daytime sleepiness | AHEI |  | 0.354 | 0.486 | 0.259 |
| HEI |  | 0.783 | 0.867 | 0.399 |
| aMed |  | 0.755 | 0.050 | 0.876 |
| AHEI: Alternate Healthy Eating Index 2010, HEI: Healthy Eating Index 2015, aMed: Alternate Mediterranean dietary pattern  Model adjusted for: total energy (when the outcome is total energy, height and weight are included in place of total energy), age, sex, race, education (some college or more), employed, income category, spouse lives in house, children live is house, total population (households) in census tract, Index of Concentration at the Extremes (ICE) of census tract, percentage of households receiving food stamps/SNAP benefits in census tract, Modified Retail Food Environment Index (MRFEI) of census tract, smoking status (never, former, current), drinking status (non-, occasional, regular drinker), physically active at work (4 or 5 on 5-point scale), physically active when not at work (4 or 5 on 5-point scale), body mass index (kg/m2), depressive symptoms (CESD ≥16), excessive sleepiness is included when excessive snoring is the exposure of interest, excessive snoring is included in the model when excessive sleepiness is the exposure of interest. | | | | | |

Table S6. Sensitivity analysis **controlling for previously measured diet in 2001-2002**: Mean differences (95% confidence intervals) in dietary pattern scores and total energy intake at follow up (2013-2016 visit) for those with high sleep apnea risk (vs. low), excessive snoring (vs. no excess snoring), and excessive sleepiness (vs. no excess sleepiness) at baseline (2007-2010 visit) in the Bogalusa Heart Study.

|  |  |  |  |
| --- | --- | --- | --- |
| **Exposure** | **Outcome** | **Model 4 in full sample (n=445) w/o previous diet in the model** | **Model 4 in sensitivity analysis sample (n=386) w/previous diet in the model a** |
| High risk for sleep apnea | AHEI | -2.32 (-3.84, -0.79) \*\* | -1.69 (-3.17, -0.22) \* |
| HEI | -1.49 (-3.14, 0.16) | -0.84 (-2.38, 0.71) |
| aMed | -0.13 (-0.39, 0.13) | 0.05 (-0.20, 0.31) |
| Excessive snoring | AHEI | -0.76 (-2.38, 0.85) | -0.64 (-2.48, 1.20) |
| HEI | 1.08 (-1.02, 3.17) | 1.04 (-1.23, 3.31) |
| aMed | 0.03 (-0.23, 0.29) | 0.10 (-0.15, 0.35) |
| Excessive daytime sleepiness | AHEI | -4.03 (-5.56, -2.50) \*\*\* | -3.37 (-4.65, -2.09) \*\*\* |
| HEI | -3.79 (-5.51, -2.06) \*\*\* | -2.55 (-4.05, -1.04) \*\*\* |
| aMed | -0.53 (-1.07, 0.00) | -0.41 (-0.91, 0.09) |

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

AHEI: Alternate Healthy Eating Index 2010, HEI: Healthy Eating Index 2015, aMed: Alternate Mediterranean dietary pattern.

All models adjusted for: total energy intake, age, sex, race, education (some college or more), employed, income category, spouse lives in house, children live is house, total population (households) in census tract, Index of Concentration at the Extremes (ICE) of census tract, percentage of households receiving food stamps/SNAP benefits in census tract, Modified Retail Food Environment Index (MRFEI) of census tract, smoking status (never, former, current), drinking status (non-, occasional, regular drinker), physically active at work (4 or 5 on 5-point scale), physically active when not at work (4 or 5 on 5-point scale), body mass index (kg/m2), depressive symptoms (CESD ≥16), excessive snoring is included in the model when excessive sleepiness is the exposure of interest.

a. Model for AHEI outcome included AHEI measured in 2001-2002; model for HEI outcome included HEI measured in 2001-2002; model for aMed outcome included aMed measured in 2001-2002.

Table S7. **Sensitivity analysis of snoring, stratified by living with spouse.** Mean differences (95% confidence intervals) in dietary pattern scores and total energy intake at follow up (2013-2016 visit) for those with excessive snoring (vs. no excess snoring), at baseline (2007-2010 visit) in the Bogalusa Heart Study.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Exposure** | **Outcome** | **Model 1** | **Model 2** | **Model 3** | **Model 4** |
| Excessive snoring in **total sample** (n=445) | AHEI | -1.15 (-2.81, 0.51) | -1.28 (-2.90, 0.33) | -1.27 (-2.80, 0.27) | -0.76 (-2.38, 0.85) |
| HEI | -0.12 (-2.36, 2.13) | 0.09 (-2.08, 2.25) | 0.28 (-1.95, 2.51) | 1.08 (-1.02, 3.17) |
| aMed | 0.02 (-0.21, 0.26) | -0.03 (-0.29, 0.23) | -0.02 (-0.29, 0.26) | 0.03 (-0.23, 0.29) |
| Excessive snoring, in sample **living with spouse** (n=299) | AHEI | -1.98 (-4.06, 0.10) | -2.27 (-4.11, 0.43) \* | -2.22 (-4.39, -0.06)\* | -1.10 (-3.61, 1.40) |
| HEI | -0.71 (-3.06, 1.65) | -0.57 (-2.87, 1.73) | -0.32 (-2.72, 2.08) | 1.14 (-1.54, 3.82) |
| aMed | -0.22 (-0.56, 0.11) | -0.37 (-0.74, 0.00) | -0.36 (-0.76, 0.04) | -0.25 (-0.66, 0.15) |
| Excessive snoring in sample **not living with spouse** (n=146) | AHEI | 0.60 (-1.95, 3.15) | 0.67 (-1.86, 3.19) | 0.76 (-1.25, 2.77) | 0.97 (-1.41, 3.36) |
| HEI | 1.11 (-2.54, 4.75) | 1.34 (-2.20, 4.89) | 1.37 (-1.97, 4.71) | 1.5 (-1.61, 4.61) |
| aMed | 0.56 (0.14, 0.99) \*\* | 0.63 (0.20, 1.07) \*\* | 0.61 (0.21, 1.00) \*\* | 0.65 (0.28, 1.02) \*\*\* |

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

AHEI: Alternate Healthy Eating Index 2010, HEI: Healthy Eating Index 2015, aMed: Alternate Mediterranean dietary pattern.

Model 1: unadjusted.

Model 2: total energy intake, age, sex, race.

Model 3: model 2 + education (some college or more), employed, income category, spouse lives in house, children live is house, total population (households) in census tract, Index of Concentration at the Extremes (ICE) of census tract, percentage of households receiving food stamps/SNAP benefits in census tract, Modified Retail Food Environment Index of census tract.

Model 4: model 3 + smoking status (never, former, current), drinking status (non-, occasional, regular drinker), physically active at work (4 or 5 on 5-point scale), physically active when not at work (4 or 5 on 5-point scale), body mass index (kg/m2), depressive symptoms (CESD ≥16), excessive sleepiness is included when excessive snoring is the exposure of interest, excessive snoring is included in the model when excessive sleepiness is the exposure of interest.

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