# Differences in the Prevalence of Cardiovascular and Metabolic Diseases Coinciding with Clinical Subtypes of Obstructive Sleep Apnea

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**Online Data Supplement**

Statistical analysis

Class analysis was performed among patients with OSA (AHI≥5 events/h), using a latent class analysis (LCA) with questionnaire data on relevant symptoms, similar to previous publications [1-4]. We used Mplus8.6 to estimate the model. The optimal number of classes was determined by running LCA to obtain solutions from 2 to 10 classes, and comparing the resulting Bayesian Information Criterion (BIC) values (Figure A.2) and LMR p-value (Table A.2). The solution with the lowest BIC value was considered the optimal number of classes [5]. The LMR p-value less than 0.05 means that the current classification quantity is different from the model with one less classification quantity in the different tests [6]. Entropy<0.60 indicates that >20% of cases are classified falsely and Entropy>0.80 indicates that >90% of cases are classified correctly [7]. Researchers believe that the choice of multiple models relies heavily on sampling results, and models with suboptimal data results are often selected in research [8]. Although the solution with 5 classes showed the lowest BIC (Figure A.1) and is significantly different from the solution with 4 classes (Table A.1), we ultimately chose the solution with 4 classes as the optimal model.
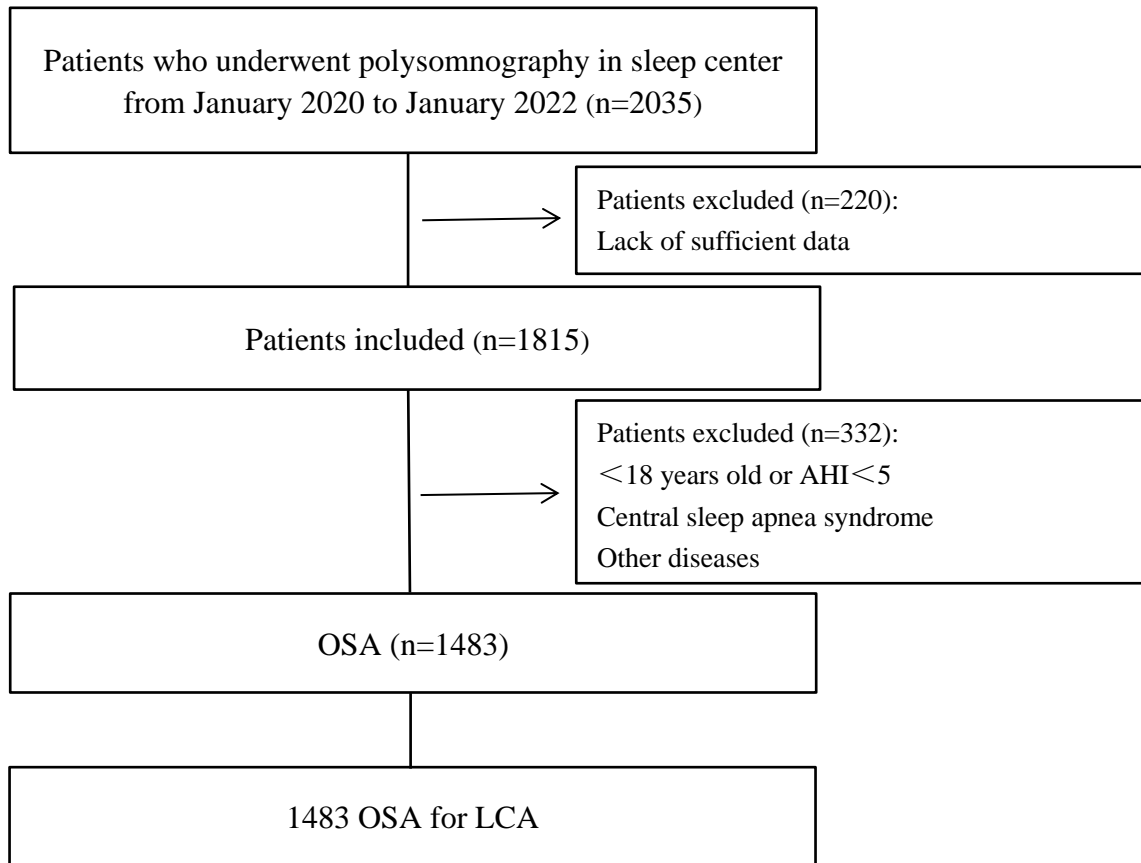
Table A.1.Description of the symptom questions for participant.

| | Question | Response | |
|---|---|---|---|
| 1 | Difficulty falling asleep? | No☐ | Yes☐ |
| 2 | Difficulty maintaining asleep? | No☐ | Yes☐ |
| 3 | Do you wake up early in the morning and are unable to fall back asleep? | No☐ | Yes☐ |
| 4 | Do you snore? | No☐ | Yes☐ |
| | Is the snoring loud (louder than talking)? | No☐ | Yes☐ |
| 5 | Do you wake suddenly and feel as if you cannot breathe during sleep？ | No☐ | Yes☐ |
| 6 | Do you perspire heavily at night? | No☐ | Yes☐ |
| 7 | Do you stop breathing at night? | No☐ | Yes☐ |
| 8 | Do you not feel rested upon waking？ | No☐ | Yes☐ |
| 9 | Distractions and loss of memory during the day? | No☐ | Yes☐ |
| 10 | Epworth Sleepiness Scale score ≥10 | No☐ | Yes☐ |

Table A.2. Latent Class Model Fit Comparison (N=1483).

| Number of Classes | Df | BIC | Entropy | LMR p-value | FftSC |
|---|---|---|---|---|---|
| 2 | 23 | 17524 | 0.64 | < 0.01 | 29% |
| 3 | 35 | 17270 | 0.70 | < 0.01 | 12% |
| 4 | 47 | 17173 | 0.73 | < 0.01 | 8% |
| 5 | 59 | 17159 | 0.73 | < 0.01 | 3% |
| 6 | 71 | 17178 | 0.70 | =0.03 | 3% |
| 7 | 83 | 17218 | 0.70 | =0.16 | 3% |
| 8 | 95 | 17256 | 0.71 | =0.24 | 3% |
| 9 | 107 | 17306 | 0.71 | =0.55 | 2% |
| 10 | 119 | 17383 | 0.72 | =0.57 | 2% |

Abbreviations: Df: degrees of freedom; BIC: Bayesian Information Criterion; LMR: Lo-Mendell-Rubin; FftSC: frequency for the smallest class

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Patients who underwent polysomnography in sleep center
        from January 2020 to January 2022 (n=2035)
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Patients excluded (n=220):
Lack of sufficient data

Patients included (n=1815)

Patients excluded (n=332):
＜18 years old or AHI＜5
Central sleep apnea syndrome
Other diseases

OSA (n=1483)

1483 OSA for LCA

Other diseases:
1. Severely impaired consciousness
2. Previous history of malignancy

Figure A.1. A flow diagram showing the analysis of patients with OSA who underwent polysomnography to determine clinical subtypes. The patients were classified as OSA if apnea-hypopnea index (AHI) $\geq$ 5 events/h.
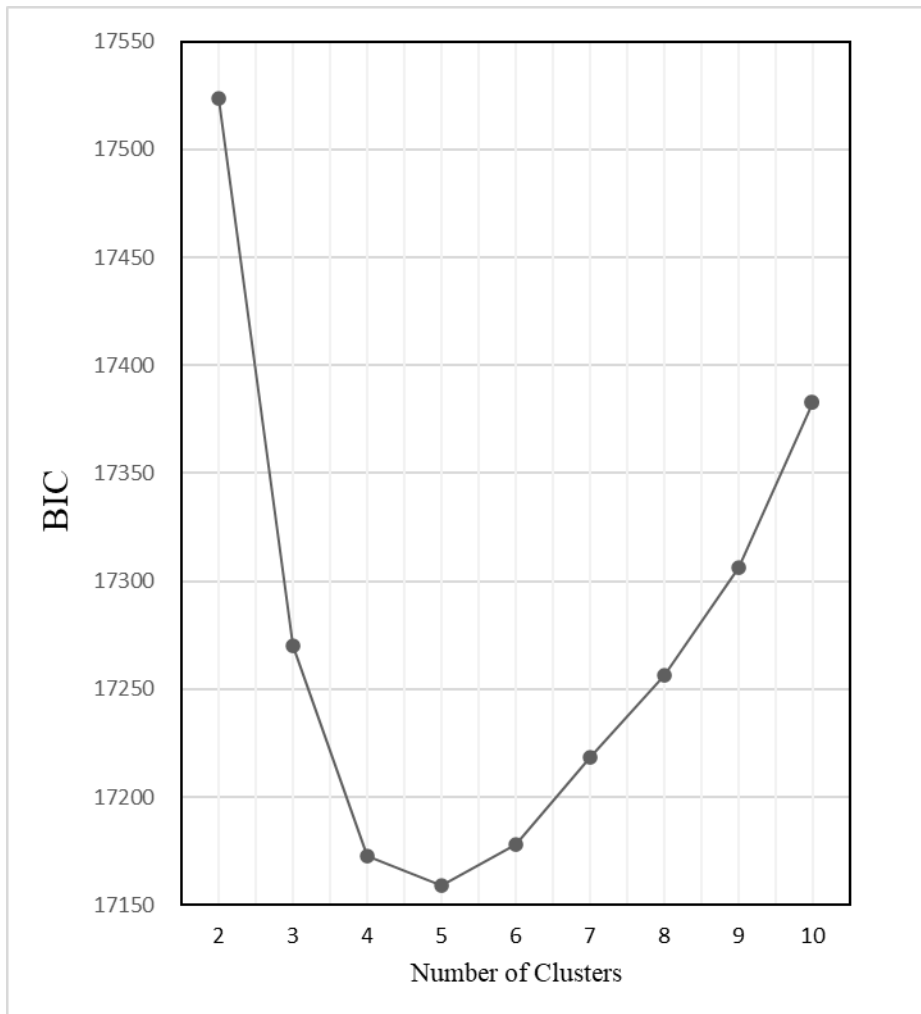
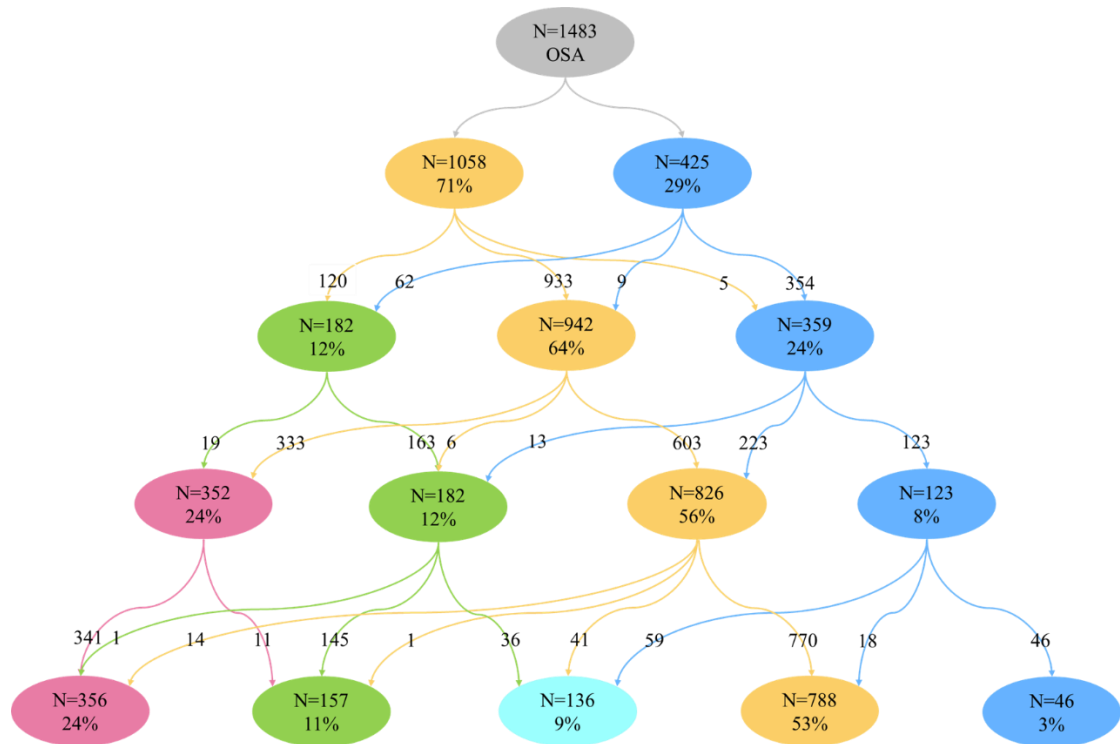Figure A.2. Comparison of the Bayesian Information Criteria statistics for Latent Class Analysis results.

Figure A.3. Assignment of 1483 patients into distinct classes over a sequence of the latent class model with two, three, four, and five classes. Ellipses show class membership whilst the values along the arrow represent the number of patients moving from one class to another in models with increasing classes.

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