**Supplemental Material 1 – eMethods 1.** Korean version of the Pittsburgh Sleep Quality Index (PSQI-K)

The PSQI-K comprises 18 questions using 4-point Likert scale (0–3). The 18 questions are categorized into 7 subscales (components scores) for sleep and daytime functions: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. Each component score can range from 0 to 3 points. For all subscales, a score of “0” means no difficulty, while a score of “3” means severe difficulty.**[[1]](#footnote-1)** Subjective sleep quality was determined by the question #6; sleep latency was formed by the questions #2 and #5a; habitual sleep efficiency was determined by the questions #1, #3, and #4; sleep duration was formed by the question #4; sleep disturbance was formed by the questions #5b–j; use sleep medication was determined by the questions #7; daytime dysfunction was formed by the questions #8 and #9. The 18 questions of PSQI-K and detailed method are as follows.

**Questionnaire of the Korean version of the Pittsburgh Sleep Quality Index (PSQI-K)[[2]](#footnote-2)**

1. 지난 한달 동안, 당신은 평소 몇 시에 잠자리에 들었습니까?

🡪 보통 오전/오후 \_\_시 \_\_분에 잠자리에 든다.

2. 지난 한달 동안, 당신은 밤에 잠자리에 들어서 잠이 들기까지 보통 얼마나 오래 걸렸습니까?

🡪 \_\_시간 \_\_\_분이 걸린다.

3. 지난 한달 동안, 당신은 평소 아침 몇 시에 일어났습니까?

🡪 보통 오전/오후 \_\_\_시 \_\_\_분에 일어난다.

4. 지난 한달 동안, 당신이 밤에 실제로 잠잔 시간은 얼마나 됩니까? (이것은 당신이 잠자리에서 보낸 시간과 다를 수 있습니다.)

🡪 하루 밤에 \_\_시간 \_\_\_분

5. 지난 한달 동안, 당신은 아래의 이유로 잠자는데 얼마나 자주 문제가 있었습니까?

a. 취침 후 30분 이내에 잠들 수 없었다.

b. 한밤중이나 새벽에 깼다.

c. 화장실에 가려고 일어나야 했다.

d. 편안하게 수 쉴 수가 없었다.

e. 기침을 하거나 시끄럽게 코를 골았다.

f. 너무 춥다고 느꼈다.

g. 너무 덥다고 느꼈다.

h. 나쁜 꿈을 꾸었다.

i. 통증이 있었다.

j. 그 외에 다른 이유가 있다면, 이 이유들 때문에 잠자는 데 얼마나 자주 어려움이 있었습니까?

🡪 □ 지난 한달 동안 없었다 (없다).

□ 한 주에 1번보다 적게 (주 1회 미만)

□ 한 주에 1~2번 정도(주 1~2회)

□ 한 주에 3번 이상 (주 3회 이상)

6. 지난 한달 동안, 당신은 전반적으로 수면의 질이 어느 정도라고 평가하십니까?

□ 매우 좋음 □ 상당히 좋음 □ 상당히 나쁨 □ 매우 나쁨

7. 지난 한달 동안, 당신은 잠이 들기 위해 얼마나 자주 약을 복용했습니까? (처방약 또는 약국에서 구입한 약)

□ 지난 한달 동안 없었다 □ 한 주에 1번보다 적게 □ 한 주에 1~2번 정도 □ 한 주에 3번 이상

8. 지난 한달 동안, 당신은 운전하거나, 식사 때 혹은 사회활동을 하는 동안 얼마나 자주 졸음을 느꼈습니까?

□ 지난 한달 동안 없었다 □ 한 주에 1번보다 적게 □ 한 주에 1~2번 정도 □ 한 주에 3번 이상

9. 지난 한달 동안, 당신은 일에 열중하는데 얼마나 많은 문제가 있었습니까?

□ 전혀 없었다 □ 매우 조금 있었다 □ 다소 있었다 □ 매우 많이 있었다

**Scoring Instructions for the PSQI-K[[3]](#footnote-3),[[4]](#footnote-4)**

**Component 1**: Subjective sleep quality consisted of the question #6 “During the past month, how would you rate your overall sleep quality”, and participants were able to choose one of the following four:

|  |  |
| --- | --- |
| **Response** | **Component 1 score** |
| Very good | **0** |
| Fairly good | **1** |
| Fairly bad | **2** |
| Very bad | **3** |

**Component 2**: Sleep latency was determined through two questions (#2 and #5a).

First, participants answered the question #2 “During the past month, how long has it usually take you to go to bed at night and fall asleep?” and the responses were scored in the following way:

|  |  |
| --- | --- |
| **Response** | **Question #2 score** |
| ≤15 minutes | **0** |
| 16-30 minutes | **1** |
| 31-60 minutes | **2** |
| > 60 minutes | **3** |

Second, participants answered the question #5a “During the past month, how often have you had trouble falling asleep because you couldn’t fall asleep within 30 minutes of going to bed?” and the responses were scored in the following way:

|  |  |
| --- | --- |
| **Response** | **Question #5a score** |
| Not during the past month | **0** |
| Less than once a week | **1** |
| Once or twice a week | **2** |
| Three or more times a week  | **3** |

In the next step, after adding the scores of the answers to the above two questions, the final component 2 score was assigned as follows.

|  |  |
| --- | --- |
| **Sum of #2 and #5a score** | **Score of component 2** |
| 0 | **0** |
| 1-2 | **1** |
| 3-4 | **2** |
| 5-6 | **3** |

**Component 3:** Sleep duration was consisted of the question #4 “During the past month, how many hours did you actually sleep at night? (This may be different from the amount of time you spent in bed), and the responses were scored in the following way:

|  |  |
| --- | --- |
| **Response** | **Score of component 3** |
| >7hours | **0** |
| 6-7 hours | **1** |
| 5-6 hours | **2** |
| <5 hours | **3** |

**Components 4:** Habitual sleep efficiency was determined by assigning score calculated in the following way to four categories.

**Hours slept** (in the past month, hours of actual sleep per night, question #4) / **Hours spent in bed** [Getting up time (question #3) – Bed time (question #1)] X 100 = **Habitual sleep efficiency (%)**

|  |  |
| --- | --- |
| **Habitual sleep efficiency (%)** | **Score of component 4** |
| ≥85% | **0** |
| 75~84% | **1** |
| 65~74% | **2** |
| <65% | **3** |

**Components 5:** Sleep disturbance was categorized by scoring the answers to the following nine questions (questions #5b-5j):

“During the past month, how often have you had trouble sleeping because you..”

1) Wake up in the middle of the night or early morning

2) Have to get up to use the bathroom

3) Cannot breathe comfortably

4) Cough or snore loudly

5) Feel too cold

6) Feel too hot

7) Had bad dreams

8) Have pain

9) Other reason(s),

For the nine questions, the participant was able to answer one of the following four questions, and each answer was scored as follows.

|  |  |
| --- | --- |
| **Response** | **Score of each question (#5b-5j)** |
| Not during the past month | **0** |
| Less than once a week | **1** |
| Once or twice a week | **2** |
| Three or more times a week | **3** |

Next, after adding all the answers to the 9 questions, the sum was re-scored as follows to complete the categorization for Component 5.

|  |  |
| --- | --- |
| **Sum of # 5b-5j score** | **Score of Component 5** |
| 0 | **0** |
| 1-9 | **1** |
| 10-18 | **2** |
| 19-27 | **3** |

**Component 6:** Use of sleep medication consisted of the question #7 “During the past month, how often have you taken medicine (prescribed or “over the counter”) to help you sleep?” and participants' responses were assigned as follows:

|  |  |
| --- | --- |
| **Response** | **Score of Component 6** |
| Not during the past month | **0** |
| Less than once a week | **1** |
| Once or twice a week | **2** |
| Three or more times a week | **3** |

**Component 7:** Daytime dysfunction was determined through the following two questions (questions #8 and #9).

First, participants answered the question #8 “During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?” and the responses were scored in the following way:

|  |  |
| --- | --- |
| **Response** | **Question #8 score** |
| Not during the past month | **0** |
| Less than once a week | **1** |
| Once or twice a week | **2** |
| Three or more times a week | **3** |

Second, participants answered the question #9 “During the past month, how often have you had trouble falling asleep because you couldn’t fall asleep within 30 minutes of going to bed?” and the responses were scored in the following way:

|  |  |
| --- | --- |
| **Response** | **Question #9 score** |
| No problem at all | **0** |
| Only a very slight problem | **1** |
| Somewhat of a problem | **2** |
| A very big problem | **3** |

In the next step, after adding the scores of the answers to the above two questions, the final component 2 score was assigned as follows.

|  |  |
| --- | --- |
| **Sum of #8 and #9 score** | **Score of component 7** |
| 0 | **0** |
| 1-2 | **1** |
| 3-4 | **2** |
| 5-6 | **3** |

**Global PSQI Score:** Finally, the Global PSQI Score added the seven component scores together.

1. Buysse DJ, Reynolds CF, 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiatry Res 1989;28:193-213 [↑](#footnote-ref-1)
2. Sohn SI, Kim DH, Lee MY, Cho YW. The reliability and validity of the Korean version of the Pittsburgh Sleep Quality Index. Sleep Breath 2012;16:803-812 [↑](#footnote-ref-2)
3. Sohn SI, Kim DH, Lee MY, Cho YW. The reliability and validity of the Korean version of the Pittsburgh Sleep Quality Index. Sleep Breath 2012;16:803-812 [↑](#footnote-ref-3)
4. Buysse DJ, Reynolds CF, 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiatry Res 1989;28:193-213 [↑](#footnote-ref-4)