7.6 Results

7.6.1 Healthy vs COPD

The average accuracy across all ten cross validation trials in classifying each night as healthy or COPD-type is shown in Figure 45. A total of 815 nights were classified from the 132 matched subjects. The mean accuracy for the single night classification was 0.89 (SD = 0.008). The maximum accuracy (0.91, SD = 0.04) was achieved setting the number of sleep modalities to 13 and using the first 13 eigenvectors. For this setting we achieved an accuracy of 0.94 (SD = 0.05) for the subject classification.

To compare the time spent in each of the 13 sleep modalities in the 1059 COPD patients and the subgroup used to extract the sleep modalities, we constructed a linear mixed-effect model (LMM) for each sleep modality, with GOLD and MMRC as ordinal explanatory variables; subset group (i.e. all COPD vs matched COPD), smoking status, country of origin, gender and day group (i.e. weekday vs. weekend day) as categorical explanatory variables; age and BMI as continuous explanatory variables. Least Squares means (LS-means) and differences of LS-means of the fixed effects were used to compare the two subset groups. To account for repeated measurements, we used random effects on two levels. On the highest level, we included a random intercept per patient. The second level, within patients, had a random intercept for each day group (weekdays vs. weekends). The residuals then accounted for the differences between days within the same day group.

The model accounts for by-subject and by-day group variability. Degrees of freedom and p-values for significant differences (significant if $p<0.05$) were computed using Satterthwaite's approximation [110]. To construct the models we used the lmer function of the package lme4 in R [109].

Comparison between the time spent in each of the 13 sleep modalities in the 1059 COPD patients and the subgroup used to extract the sleep modalities (Figure 46) shows that there are no statistical differences ($p>0.1$) in the time spent in each sleep modality between the two groups. This indicates that the sleep modalities, created using a subset of patients, are able to generalize across many COPD patients.