which were still able to identify heterogeneous groups amongst different samples of patients with COPD [71, 72, 73, 74, 75].

### 4.2.5 Daily physical activity after stratification for seasons of the year

Daily physical activity measures after stratification for seasons of the year can be found in Table XVII in the appendix.

## *4.3 Study design and participants*

In this retrospective, multicentre, cross-sectional study, objectively assessed physical activity data from ten countries (i.e., United Kingdom, Ireland, the Netherlands, Germany, Switzerland, Italy, Spain, the United States of America (USA), Brazil, and Australia) were analysed. Published and/or unpublished physical activity data from previous studies as assessed by the SenseWear Armband or SenseWear Mini Armband activity monitors (both from BodyMedia Inc., Pittsburgh, PA, USA) were considered for analysis, details of data sources can be found in the appendix. In studies that included longitudinal analyses, only the baseline data were used meaning that the subjects included in the current analysis were not undergoing any specific intervention by the time of assessment. Subjects were included if they had: COPD with a post-bronchodilator forced expiratory volume in the first 1 second ($FEV_1$) / forced vital capacity (FVC) ratio <0.70 [9], clinical stability at the time of physical activity assessment, and complete data for age, sex, body mass index (BMI) and daily physical activity measures. Ethics Board approval was obtained from the local ethics committees/institutional review boards, and written informed consent was provided by participants, except for the data from Italy (n=23) which were obtained as part of routine clinical assessments. The Italian data, however, were de-identified to protect patient information confidentiality.

### 4.3.1 Assessment

Demographics, anthropometrics, lung function, and clinical data were assessed. In order to investigate their association with physical activity measures and hourly patterns, these outcomes were stratified according to established criteria or according to the median value (i.e., above or below the median). The SenseWear Armband or SenseWear Mini Armband activity monitors, which use multisensory data in combination with pattern recognition algorithms to reliably estimate energy expenditure (EE) and metabolic equivalents of task (METs) [76], were used to assess physical activity [77, 78, 79, 80]. METs data are divided into activity intensity levels using the thresholds proposed by the American College of Sports Medicine [81]: very light intensity, <2.0 METs; light intensity, 2.0 to 2.9 METs; and moderate-to-vigorous intensity, $\geq$3.0 METs.

Subjects with a minimum of four recorded days (two weekdays + Saturday + Sunday) [44] with the device being used for $\geq$22 hours·day$^{-1}$ [82] were included in the analyses. Only recordings during waking hours of weekdays were considered for the cluster analysis, since physical activity measures during the weekend are known to be different [44] and therefore could bias the analyses. The physical activity measures represent the average of all valid