1. **Introduction**

This document provides a detailed codebook for the dataset comprising physical activity variables captured by wearable devices across 100 patients. These wearables track various types of physical activities such as running, walking, and periods of no physical activity. The dataset includes time-stamped entries for each activity and records associated metrics like heart rate, calories burned, exercise duration, and sleep patterns.

The following sections define each variable in the dataset, outlining its format and potential range of values. Additionally, the codebook explains the reason behind missing values in specific columns based on the type of activity.

1. **Codebook**

| **Variable Name** | **Description** | **Data Type** | **Possible Values/Units** |
| --- | --- | --- | --- |
| Datetime | The timestamp when the data was recorded. The format is YYYY-MM-DD HH:MM. | String | Datetime format (e.g., 2022-12-08 15:12) |
| Code | The activity code that corresponds to specific physical activities captured by the device. | String | Unique codes (e.g., LA11836-6) |
| Activity\_Type | Describes the type of activity recorded (e.g., Running, No Physical Activity). | String | Categories: Running, Walking, No Physical Activity |
| Heart rate\_\_\_beats/minute | The heart rate of the patient during the recorded activity. Measured in beats per minute (BPM). | Float | Numeric values (e.g., 144.0 BPM) |
| Calories burned\_kcal | The estimated calories burned during the activity. | Float | Numeric values (e.g., 10.0 kcal) |
| Exercise duration\_s | The duration of the physical exercise during the recorded activity, measured in seconds. | Float | Numeric values (e.g., 20821.0 seconds) |
| Sleep duration\_minutes | The total duration of sleep, measured in minutes. This variable is relevant only for sleep-related activities. | Float | Numeric values (e.g., 360.0 minutes) |
| Sleep type duration\_minutes | The duration of a specific type of sleep (e.g., deep sleep), measured in minutes. | Float | Numeric values (e.g., 180.0 minutes) |
| Floors climbed\_\_\_floors | The number of floors climbed by the individual during the physical activity session. | int | Numeric values (e.g., 5.0 floors) |

1. **Explanation of Missing Values**

In this dataset, missing values in certain columns are expected and are related to the type of physical activity being recorded. These are explained below:

* **Heart Rate and Calories Burned**: These values may be missing during periods labeled as "No Physical Activity" because the wearable device may not continuously monitor these metrics when no significant physical activity is detected.
* **Exercise Duration**: This field is only populated during specific physical activities (e.g., running or walking). For periods of inactivity or sleep, the exercise duration will appear as missing (NaN).
* **Sleep Duration and Sleep Type Duration**: These fields are only populated during sleep tracking sessions. They will be missing for all physical activities like running, walking, or periods of no physical activity.
* **Floors Climbed**: This metric is specific to certain activities like running or walking and may not be relevant to sleep or sedentary behavior, leading to missing values.

The presence of missing values reflects the wearable's capabilities in tracking different types of activities, ensuring relevant data is collected only during appropriate contexts (e.g., monitoring heart rate during physical activity, tracking sleep duration during rest periods).