

README file

A README file is often the first file someone will open in your data repository. The purpose of this file is to provide a roadmap for your data deposit and contextualize your project by providing [metadata](#) for the inquirer.

Instructions: Fill out this document to its entirety and upload with your data deposit in an American Heart Association approved [repository](#).

Each data deposit into a repository requires a README file and a Data Dictionary.

General information

10/1/2025

1. PI's name: [Dr. S. Justin Thomas](#)
2. PI's ORCID ID: [0000-0002-8709-4083](#)
3. Association award number: [19CDA34660139](#)
4. Association award doi: [Enter Association award doi](#)
5. Association award title: [Central and Peripheral Circadian Mechanisms Underlying Non-Dipping Blood Pressure in Blacks](#)
6. Date range of data collection: [04/01/2019 – 03/31/2022](#)
7. List of up to six key words to describe data topic:
 - a. [Blood pressure](#)
 - b. [Circadian Rhythms](#)
 - c. [Health Disparities](#)
 - d. [Blood Pressure Dipping](#)
 - e. [Black/African American Adults](#)
 - f. [Constant Routine Protocol](#)
8. Other: [N/A](#)

Data and file overview

1. For each file name, a short description of what data it contains. [Please see the list of file names, descriptions, what files contain, and the dates that files were created below.](#)

File Name	Description	Contents	Dates created
Participant_Characteristics.xlsx	Participant demographics and baseline characteristics; used to	One row per participant; includes participant demographics such as age,	09/26/2025

	generate descriptive statistics.	sex, BMI, etc. Intended input for <i>AHA-Descriptive.Rmd</i> .	
CBT.Raw-Data.xlsx	Raw core body temperature (CBT) records for each participant in separate sheets.	Separate sheet for each participant. Key variables are ID, Datetime and CBT.F. Intended input for <i>CBT.AHA.Rmd</i> .	09/26/2025
AHA Dataset-Final.xlsx	Final harmonized constant routine dataset prepared for cosinor modeling.	One row per time point per participant; includes ID, Time.In.Trial.Hrs, ambulatory BP variables, salivary melatonin concentration, CBT (smoothed). Intended input for <i>AHA-CDA (Final).Rmd</i> .	08/11/2025
Data Dictionary_AHA_v1.xlsx	Data Dictionary for all datasets.	Includes an index sheet summarizing all datasets and their data dictionaries.	09/24/2025

2. Other: [N/A](#)

Note the data files you upload should be in a common format, accessible by anyone (Excel, Word, pdf, CSV, txt). Data files should not require a specialized software or application to open. Any analyses performed should be described below in sharing and access information (software, hardware with version).

The Association's Open Science Policy states: Any factual data that is needed for independent verification of research results must be made freely and publicly available in an Association-approved [repository](#) as soon as possible, and no later than the time of an associated publication or the end of the award period (and any no-cost extension), whichever comes first.

Sharing and access information

1. [Licenses](#) on data (The Association recommends CC-0 + attribution or CC-BY 4.0): Creative Commons Zero v1.0 Universal
2. [Licenses](#) on source code: [N/A](#)
3. Links to other data deposits/repository links: [N/A](#)
4. Recommended citation for the data: Gloston, G., Jain, S., Balagee, V., Datta, R., Gamble, K., Peterson, C., & Thomas, J. (2025). AHA-CDA-Circadian-Rhythm-Analysis (Version 1.0.0) [Computer software]. <https://doi.org/10.5281/zenodo.1234>

Methodological information

1. Description of model:
 - a. Human, animal: **Human**
 - i. Animal model, enter additional information: **N/A**
 - b. Sex: **Male and female**
 - c. Sample size: **31**
 - d. Age: **18-65**
 - e. Disease state: **All participants self-identified as Black/African American adults with no history of hypertension**
 - f. Interventions: **N/A**
 - g. Comparisons: **Comparing Black/African American adults with and without dipping blood pressure**
 - h. Other: **N/A**
2. Description of methods for data collection (may include links or references to publications or other documents): **During the screening process, participants completed 24-hour ambulatory blood pressure monitoring (ABPM) in which blood pressure (BP) was read every 30 minutes via the Spacelabs 90227 device (Spacelabs Healthcare, WA, USA). Participants also completed 1 night of home sleep testing using the ResMed ApneaLink Air (ResMed Corporation, Poway, California) and 7 days of wrist actigraphy using the Philips Respironics Actiwatch 2 (Philips Respironics Inc., Pittsburgh, Pennsylvania). During the screening process, participants' weight and height were also collected. Eligible participants completed a 30-hour constant routine protocol while having their blood pressure read every 30 minutes and providing hourly saliva samples and continuous core body temperature (CBT) monitoring. Saliva samples were processed, and salivary melatonin was quantified using the RIA Buhlman Laboratories' direct saliva melatonin radioimmunoassay (RIA) kit (RK-DSM2-U). Core body temperature was collected every 10 seconds via ingestion of a CorTemp Sensor and Bluetooth transmission of core body temperature to the CorTemp Data Recorder device (HQInc, Human Technologies, Palmetto, Florida, USA).**
3. Description of methods used for processing data (how were data processed from raw data to analyzed data): **Please see below:**

Step 1: Descriptive Analysis

Source: *Participant_Characteristics.xlsx*

- Generated summary tables comparing dipping-status groups (dippers vs. non-dippers).
- For continuous variables, used two-sample t-tests
- For categorical variables, used chi-square/Fisher's exact test.

Step 2: CBT Preprocessing and smoothing

Source: *CBT.Raw-Data.xlsx*

- Merged all participant-level datasets into a single long-format dataset.
- Excluded the first 6 hours of the data to reduce potential start-up artifacts and early acclimation effects.
- Binned observations into 30-minute intervals to match analysis-ready structure.
- Applied a principled convex optimization-based framework to denoise raw core body temperature.
- Generated raw vs. smoothed ID-level plots for comparison.
- Exported the smoothed CBT series into Excel, which was then used in the final dataset.

References: Parekh, A., Selesnick, I. W., Baroni, A., Miller, M., Cavedoni, B., Sanders, H., Varga, A. W., Blessing, E., Rapoport, D. M., Ayappa, I., & Osorio, R. S. (2019). Nonlinear Smoothing of Data with Random Gaps and Outliers (DRAGO) Improves Estimation of Circadian Rhythm. 2019 IEEE Signal Processing in Medicine and Biology Symposium (SPMB), 1–6. <https://doi.org/10.1109/SPMB47826.2019.9037837>

Step 3: Main Analysis of constant routine data

Source: *AHA Dataset-Final.xlsx*

- For each participant, fit a nonlinear cosinor model to CBT to estimate the CBT minimum, which served as the 0° circadian phase reference marker.
- Aligned all measurements by circadian phase relative to each participant's CBT minimum.
- Plotted scatterplots and loess overlays for each outcome to evaluate distribution, outliers, and apparent rhythmicity.
- Tested the existence of circadian rhythms within each dipping-status group using a linearized mixed-effect multicomponent cosinor model with a fundamental circadian component (24.1 h), a harmonic component (12.05 h), and an optional linear time trend.
- The fixed-effect coefficients from this model were used to compute cosinor parameters (MESOR, amplitude and acrophase). These parameters were then used to generate cosinor curves for visualization in GraphPad Prism (Version 10.6.1).

References:

- Cornelissen, G. (2014). Cosinor-based rhythmometry. *Theoretical Biology and Medical Modelling*, 11(1), 16. <https://doi.org/10.1186/1742-4682-11-16>
- REFINETTI, R., LISSEN, G. C., & HALBERG, F. (2007). Procedures for numerical analysis of circadian rhythms. *Biological Rhythm Research*, 38(4), 275–325. <https://doi.org/10.1080/09291010600903692>
- Shea, S. A., Hilton, M. F., Hu, K., & Scheer, F. A. J. L. (2011). Existence of an Endogenous Circadian Blood Pressure Rhythm in Humans That Peaks in the Evening. *Circulation Research*. <https://doi.org/10.1161/CIRCRESAHA.110.233668>

4. Describe any software or instruments needed to interpret or understand the data/results of your study. Please be specific to include software and hardware version numbers. **All**

statistical analyses were conducted in R (Version 4.4.2) and Microsoft Excel (Version 16.101.1), and visualizations of phase-aligned cosinor curves were produced in GraphPad Prism (Version 10.6.1).

5. Other: [N/A](#)