Visit 17 – Actigraphy Dataset

CODEBOOK

ARCHIVED DATASET 2026

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DOCUMENTATION FOR THE SWAN VISIT 17 ACTIGRAPHY DATASET

This dataset contains all publicly available SWAN Visit 17 actigraphy data. This includes the actigraphy enrollment form, the weekly physical activity data, and the sleep summary data.

A. Who is included in the public use dataset:

The dataset contains information for the 788 women with Visit 17 actigraphy data from the seven participating SWAN clinical sites. The sites include 11, 12, 13, 14, 15, 16 and 17.

The assigned participant ID has been replaced with a randomly generated ARCHID in order to protect participant privacy. The baseline interview date is denoted as day 0 and is used as the basis for all other dates. Variables describing the race/ethnicity of participants (RACE) was added from the Screener dataset.

B. Missing data coding:

Original missing codes (-1: not applicable, -7: refused, -8: don't know, -9: missing) have been recoded to SAS missing codes (.B: not applicable, .D: refused, .C: don't know, and .A: missing).

C. Weekly Physical Activity Actigraphy Data

The weekly physical activity data was gathered from the ActiGraph wGT3X-BT Accelerometer waist monitor worn by a subset of SWAN women at Visit 17 for 10 hours for at least four days. The weekly dataset has a single observation from each ID summarizing her activity over the period that she wore the monitor (NOTE: this is NOT standardized to a week for each woman. The data may be from more or less than 7 days – see the variable TOT10D_S17 for the number of days a woman wore the waist monitor).

Sample selection:

Women were asked during in-person SWAN visits if they would be willing to wear the waist-worn physical activity monitor in addition to a wrist-worn sleep monitor. Each site was asked to recruit an equal amount of white and ethnic minority women, prioritizing women who participated in the original SWAN Ancillary sleep study.

Accelerometer protocol:

Accelerometer data was collected over an 8-day period for each woman participating in the protocol. Women were instructed to wear an ActiGraph wGT3X-BT Accelerometer waist monitor during hours she was awake, removing it to shower and swim. She also filled out a diary each day to record when she put the monitor on and removed it. After 8 days of wear, she was instructed to mail the monitor and the Physical Activity Diary back to the SWAN study site in a pre-addressed, pre-stamped envelope.

When the monitors were returned to the sites, participant data was downloaded using ActiLife6 software. The downloaded files are then sent to the Coordinating Center for file reintegration and data reduction and processing.

Data processing:

Using the Actilife6 software, files were reintegrated from raw data, collected at 40 Hz each second, to 60 second intervals (epochs). The reintegrated files were then processed through an R package called "PhysicalActivity" that includes an algorithm called the Choi Algorithm to detect and remove periods of non-wear of the accelerometer.[1] The days that a woman reported starting and stopping wearing then monitor from the Physical Activity Diary were also used to estimate wear time, per recommendations from Keadle et al.[2]

Once the non-wear periods were removed, daily summary estimates of sedentary time and physical activity were calculated and weekly summary estimates of sedentary time and physical activity are calculated for participants with at least 4 valid days of 10 or more hours of wear time.

Raw data from accelerometers were read in one minute "epochs," each of which has a three-dimensional numerical value of the intensity of movement (i.e., accelerometer count) a woman was doing during that minute. To estimate the time spent sedentary and in light-, moderate-, and vigorous- intensity physical activity, established accelerometer count cut point threshold values are applied.

For SWAN, three commonly used count cut-point threshold strategies were selected for use with the vertical axis count data only: NHANES[3], Freedson[4], and Matthews[5] cut points. All variables using specific cut-point thresholds contain a single letter near the end of the variable name identifying the method used – "N" for NHANES, "F" for Freedson, and "M" for Matthews.

In addition to data output from the vertical axis, the vector magnitude (VM) estimates are also included. Vector magnitude is the square root of the sum of squares of each axis of data. To operationalize the triaxial count data into time spent sedentary and in light-, moderate-, and vigorous intensity physical activity, Evenson cutpoints[6] were used. All variable using triaxial data contain "VM" near the end of the variable names.

Alongside the accumulated number of minutes spent per day in moderate to vigorous intensity physical activity, the frequency and duration of "bouts" of MVPA accumulated for at least 8 out of 10 consecutive minutes were calculated.[7]

The standard naming formula for the variables with specific cut points and/or bout calculations are as follows:

Prefix	Meaning
BF	Bout Frequency
BD	Bout Duration

Core	Meaning
SED	Sedentary
LITE	Light Intensity
LLITE	Low-Light Intensity
HLITE	High-Light Intensity
MOD	Moderate Intensity
MLI	Moderate Lifestyle Intensity
MWI	Moderate Walk Intensity
MVPA	Moderate to Vigorous Intensity
VIG	Vigorous Intensity
MET	Estimated Energy Expenditure

Suffix 1	Meaning
M	Matthews
F	Freedson
N	NHANES
VM	Vector Magnitude
S	Schwartz

Suffix 2	Meaning
_M	Mean
_S	Sum

For example, variables in the weekly dataset include:

- MWIM_M17: Mean Daily Moderate Walk Intensity Time - Matthews (min/day ct=1952-5724)
- MODF_S17: Total Min Moderate Intensity (Freedson) Over All Min of All Full Days
- VIGN_M17: Mean Daily Vigorous Intensity Time - NHANES (min/day ct>=5999)
- BDMVPAVM_M17: Mean Daily MVPA Bout Duration - VM (min/day ct>=2075, 8/10 min)

Note that variables are all appended with "17" to indicate the visit number, with the exception of the variables ID and VISIT.

Important note on sampling rate:

The ActiGraph wGT3X-BT activity monitor has a user-selectable sampling rate ranging from 30 Hz to 100 Hz. According to the SWAN protocol, all sites were to set the sampling rate at 40 Hz. This protocol was followed correctly by all sites at Visit 15. However, at Visit 17 two of the clinical sites (16 and 17) accidentally set the sampling rate to 30 Hz for some of their participants, as follows:

Site 16

- Total N = 36
- Total set at 40 Hz = 7 (19.4%)
- Total set at 30 Hz = 29 (80.6%)

Site 17

- Total N = 154
- Total set at 40 Hz = 140 (90.9%)
- Total set at 30 Hz = 14 (9.1%)

A flag (FLG30HZ17) has been created to indicate cases where the data were collected at the 30 Hz sampling rate. While we believe that the impact of this difference is sampling rate on the data is small, it is recommended that sensitivity analysis be conducted including and excluding these cases to assess the impact on results. For analyses more focused on race/ethnicity, sensitivity analysis may not be a practical option given the very low number of Hispanic observations set at 40 Hz. In these cases, we recommend that analysts determine how many flagged cases are part of final analysis samples and provide this information as a potential limitation in discussion of results.

Created flag variables: After the data were processed by the R code, several flags were added.

- **GE10DFLG17:** Flag for if a participant wore the monitor for more than 10 days (protocol stated only 8 were expected).
- **WAKE18A17:** Flag for if a participant wore the monitor for more than 18 hours on average (NOTE: this is different than the same variable name in the daily data set).
- **FLG30HZ17:** Actigraph sampling rate set to 30 Hz instead of the SWAN standard rate of 40 Hz.

Correcting for sleep & sedentary time overlap:

As part of the data cleaning process for the physical activity actigraphy, some corrections needed to be made such that there was no overlapping data with the sleep actigraphy datasets. There are two main parts to this process: 1) identifying waking activity and sleep activity pairings that constitute a single day, and 2) correcting the activity measures so that a person's sleep isn't measured as sedentary activity.

When identifying these pairings, the Choi algorithm is first run using the raw data, after which waking/sleeping pairs are determined by choosing pairs under 1440 minutes (24 hours) that have a minimum amount of time in between start/stop instances. If this condition is not met, then the activity period does not get paired with a sleep period. Ideally, an activity period will be paired with a sleep period both before and after the recorded activity, but there are some instances where an activity period was only paired with either a preceding or proceeding sleep period, and others where the activity period was not able to be paired with any sleep period. Once these sleep-to-wake transitions were determined, the initial range of activity periods were updated so that there was no overlap with sleep, and the Choi algorithm was re-run with these new boundaries. Below is a summary of how the daily activity records were corrected by the sleep data:

If/How Activity Data is Corrected by Sleep Data	**N**
The daily activity period was successfully paired with sleep periods both before and after. There is no overlap between sleep and sedentary activity time.	3900
The daily activity period only has sleep paired before the activity occurred, but not after. There is still potential overlap between sedentary activity and sleep around the time the individual was falling asleep.	164
The daily activity period only has sleep paired after the activity occurred, but not before. There is still potential overlap between sleep and sedentary activity around the time the individual was waking up.	850
The daily activity period was not paired with any sleep periods. There is still potential overlap between sleep and sedentary activity at the times when the individual was waking up and falling asleep.	437

Sources:

1) https://cran.r-project.org/web/packages/PhysicalActivity/index.html
2) Keadle SK, Shiroma EJ, Freedson PS, Lee IM. Impact of accelerometer data processing decisions on the sample size, wear time and physical activity level of a large cohort study. BMC Public Health. 2014 Nov 24;14:1210. doi:10.1186/1471-2458-14-1210.
3) Troiano RP, Berrigan D, Dodd KW, Mâsse LC, Tilert T, McDowell M. Physical activity in the United States measured by accelerometer. Med Sci Sports Exerc. 2008 Jan;40(1):181-8. PubMed PMID: 18091006.
4) Freedson PS, Melanson E, Sirard J. Calibration of the Computer Science and Applications, Inc. accelerometer. Med Sci Sports Exerc. 1998 May;30(5):777-81. PubMed PMID: 9588623.
5) Matthew CE. Calibration of accelerometer output for adults. Med Sci Sports Exerc. 2005 Nov;37(11 Suppl):S512-22. Review. PubMed PMID: 16294114.
6) Evenson KR, Wen F, Herring AH, Di C, LaMonte MJ, Tinker LF, Lee IM, Rillamas-Sun E, LaCroix AZ, Buchner DM. Calibrating physical activity intensity for hip-worn accelerometry in women age 60 to 91 years: The Women's Health Initiative OPACH Calibration Study. Prev Med Rep. 2015;2:750-756. PubMed PMID: 26527313; PubMed Central PMCID: PMC4625400.
7) Troiano RP, Berrigan D, Dodd KW, Mâsse LC, Tilert T, McDowell M. Physical activity in the United States measured by accelerometer. Med Sci Sports Exerc. 2008 Jan;40(1):181-8. PubMed PMID: 18091006.

D. Sleep Summary Actigraphy Data

Description of Actigraphy sleep data collection & processing

Participants wore the actigraphy device (AW-2 Philips Respironics) continuously on their non-dominant wrist, for a mean of "x" days. Participants were instructed to press the event-marker when they went to bed to sleep and when they got out of bed to start the day. The AW-2 accelerometer was set at 0.05 g for 3 to 11 Hz. The analog signal was digitized by the digital integration method. The wake threshold was set at 40 counts per minute. Data were sampled in one-minute epochs and analyzed with the sleep detection algorithm by Actiware 5.0.9 software (Philips Respironics).

Actigraphy records were given an initial quality check on receipt to the Center for Sleep and Circadian Sciences (CSCS) at the University of Pittsburgh. The initial review determined if the recording encountered any issues, such as watch failure, initialization and/or download error. Furthermore, a minimum of 3 nights of continuous actigraphy recording was required for further analysis. Notations on each record were taken and included information on the number of naps indicated in the diary, if the Actiwatch was removed on any given night, and if the participant's overall rest/active pattern was consistent or varied. Notes were also taken if any given nap was indicated in the diary but corresponding actigraphy data did not score any sleep during that time-period. It was also noted if the event-markers were used as instructed or if

the rest intervals were set using the diary times. A data field indicating the source of the rest interval is included in the final dataset.

All records were scored with the diary “in-hand”. The diary was reviewed for nap times and information on any watch removal times. Rest intervals were set using the event-marker as a first choice where possible. Many of the participants used the event-marker as instructed. If no event-markers were present or were used in a sporadic manner the diary times of “I tried to go to sleep” and “I got out of bed” were used to set the rest interval. There were participants that did not complete and/or return a diary to their site. In these cases, automated scoring was used and indicated in the record.

In cases where the participant indicated a nap that preceded or proceeded her primary rest interval by less than 30 minutes the nap time was incorporated into the primary rest interval. There were a few occasions where daytime naps were indicated in the actigraphy record by event-markers but not indicated in the diary. These naps were scored using the event-markers.

An emphasis was placed on ensuring a record of actigraphy for each corresponding diary record. In cases where the participant removed the watch during a primary rest period a rest interval was set and the data were subsequently exported. These individual nights of actigraphy rest/sleep were then given a “Bad” use code in the dataset and a comment, “Watch removed”. This was done to minimize confusion for investigators using both the actigraphy and diary datasets. Investigators will expect 7 nights of actigraphy and corresponding diary data; if the number of expected records do not match, the explanation is available.

Each SWAN site actigraphy database was automatically uploaded to the SWAN Website and received by the CSCS on a weekly basis. Records were scored in batches of 17 to 30 records per site, per week, and exported in a .csv file format.

The exported data file was also cleaned of any non-data records prior to import into SQL. Non-data records were usually found at the beginning and end of an actigraphy record. These would include periods of time where the participant had not yet put the device on her wrist and periods of time from the end of the study until download of the data record on site.

A front-end Access database, with SQL Server back-end, was developed by the actigraphy experts at the CSCS. The imported data file was then run through a series of SQL views. At this stage of data cleaning, two monitor screens are used, one where the actigraphy records are viewed and one where the corresponding data record is viewed. One SQL view was developed to tease out the nap records, once identified in the data and then confirmed by view of the actogram, the interval identification was changed to “nap”. This allows all rest and sleep periods to be easily separated for analyses. SQL views were also run to confirm any outlier data values in the variables of Bedtime, Waketime, Sleep Onset Latency, Total Sleep Time, Total Wake Time, Interval duration, Fragmentation Index and Percent Invalid data.

The final cleaned data files were then exported into excel format and sent to the SWAN Coordinating Center via the SWAN Website. The SWAN Coordinating Center also received, for each actigraphy record, the epoch-by-epoch data file, a copy of the cleaned data Actogram, corresponding light data file, and the most recent Actiware database for each site. A tracking file for each record provides the SWAN CC with additional information on overall data quality and comments.

The SWAN CC data and analysis teams ran their data queries, on each rest/sleep interval, to test for inconsistencies, outliers, and missing records. The SWAN CC would then send their inquiries back to the CSCS for review. Each record was reviewed using the actogram and any needed value, scoring, or comment changes were made. The files were then sent back to the SWAN CC for further review. This process continued until no results appeared in their queries.

Variables included in the dataset:

Variable	Label	Codes
ARCHID	Participant ID	
VISIT	Study Visit	"17" = Visit 17
RACE	Race/Ethnicity	1 = Black 2 = Chinese/Chinese American 3 = Japanese/Japanese American 4 = White Non-Hispanic 5 = Hispanic
Actigraphy Enrollment Form Variables		
DCOMPDAY17	Day of Actigraphy Enrollment Form Completion	Days since baseline interview
AGE17	Age at Interview (Continuous)	[Numeric]
WATCHGIV17	Agree to Wear Actiwatch?	1 = No 2 = Yes
DGACTDAY17	Day Actiwatch Given	Days since baseline interview
WGT3XGIV17	Agree to Wear Actigraph WGT3X	1 = No 2 = Yes
DGWGTDAY17	Day Actigraph WGT3X Given	Days since baseline interview
ACTIWRET17	Was Actiwatch Returned?	1 = No 2 = Yes
DRACTDAY17	Day Actiwatch Returned	Days since baseline interview
WGT3XRET17	Was Actigraph WGT3X Returned?	1 = No 2 = Yes
DRWGTDAY17	Day Actigraph WGT3X Returned	Days since baseline interview
DIARYRET17	Was Sleep Diary Returned?	1 = No 2 = Yes
OUTOF17	Pt Seen Outside of Visit 17 Window	0 = Not Flagged 1 = Flagged
Physical Activity Variables		
TOT10D_S17	Total Days Monitor Worn >=10 hrs	[Numeric]
NWPER_M17	Mean # Non-wear Periods (per day)	[Numeric]
OBSMIN_M17	Mean Daily Wear Time (min/day)	[Numeric]
TOTCTD_M17	Mean Total Accel Counts Over All Min of All Full Days	[Numeric]
MEANCTD_M17	Mean Daily Avg Accel Counts Over All Min of All Full Days	[Numeric]
TOTVM_M17	Mean Total VM Counts Over All Min of All Full Days	[Numeric]
MEANVM_M17	Mean Daily Avg VM Counts Over All Min of All Full Days	[Numeric]
METF_M17	Mean Daily METs - Freedson Equation	[Numeric]
METS_M17	Mean Daily METs - Schwartz Equation	[Numeric]
BREAK_M17	Mean Daily Inactive-to-Active Transitions	[Numeric]
BREAKPH_M17	Mean Daily Inactive-to-Active Transitions (per inactive hr)	[Numeric]
INACT_M17	Mean Daily Sedentary Min (ct<100)	[Numeric]
ACTIVE_M17	Mean Daily Active Min (ct>=100)	[Numeric]
LITEM_M17	Mean Daily Light Intensity Time - Matthews (min/day ct=100-759)	[Numeric]
MLIM_M17	Mean Daily Moderate Lifestyle Intensity Time - Matthews (min/day ct=760-1951)	[Numeric]
MWIM_M17	Mean Daily Moderate Walk Intensity Time - Matthews (min/day ct=1952-5724)	[Numeric]
MODM_M17	Mean Daily Moderate Intensity Time - Matthews (min/day ct=760-5724)	[Numeric]
MODM_S17	Total Min of Mod Intensity (Matthews) Over All Min of All Full Days	[Numeric]

Variable	Label	Codes
VIGM_M17	Mean Daily Vigorous Intensity Time - Matthews (min/day ct>=5725)	[Numeric]
VIGM_S17	Total Min of Vigorous Intensity (Matthews) Over All Min of All Full Days	[Numeric]
MVPA1M_M17	Mean Daily MVPA1 Time - Matthews (min/day ct>=760)	[Numeric]
MVPA1M_S17	Total Min MVPA1 (Matthews) Over All Min of All Full Days	[Numeric]
MVPA2M_M17	Mean Daily MVPA2 Time - Matthews (min/day ct>=1952)	[Numeric]
MVPA2M_S17	Total Min MVPA2 (Matthews) Over All Min of All Full Days	[Numeric]
LITEF_M17	Mean Daily Light Intensity Time - Freedson (min/day ct=100-1951)	[Numeric]
MODF_M17	Mean Daily Moderate Intensity Time - Freedson (min/day ct=1952-5724)	[Numeric]
MODF_S17	Total Min Moderate Intensity (Freedson) Over All Min of All Full Days	[Numeric]
VIGF_M17	Mean Daily Vigorous Intensity Time - Freedson (min/day ct>=5725)	[Numeric]
VIGF_S17	Total Min Vigorous Intensity (Freedson) Over All Min of All Full Days	[Numeric]
MVPAF_M17	Mean Daily MVPA Time - Freedson (min/day ct>=1952)	[Numeric]
MVPAF_S17	Total Min MVPA (Freedson) Over All Min of All Full Days	[Numeric]
LITEN_M17	Mean Daily Light Intensity Time - NHANES (min/day ct=100-2019)	[Numeric]
MODN_M17	Mean Daily Moderate Intensity Time - NHANES (min/day ct=2020-5998)	[Numeric]
MODN_S17	Total Min Moderate Intensity (NHANES) Over All Min of All Full Days	[Numeric]
VIGN_M17	Mean Daily Vigorous Intensity Time - NHANES (min/day ct>=5999)	[Numeric]
VIGN_S17	Total Min Vigorous Intensity (NHANES) Over All Min of All Full Days	[Numeric]
MVPAN_M17	Mean Daily MVPA Time - NHANES (min/day ct>=2020)	[Numeric]
MVPAN_S17	Total Min MVPA (NHANES) Over All Min of All Full Days	[Numeric]
SEDVM_M17	Mean Daily Sedentary Time - Evenson/VM (min/day ct=0-75)	[Numeric]
LLITEVM_M17	Mean Daily Low-Light Intensity Time - VM (min/day ct=76-903)	[Numeric]
HLITEVM_M17	Mean Daily High-Light Intensity Time - VM (min/day ct=904-2075)	[Numeric]
MVPAVM_M17	Mean Daily MVPA Time - VM (min/day ct>=2075)	[Numeric]
MVPAVM_S17	Total Min MVPA (VM) Over All Min of All Full Days	[Numeric]
BFMVPA1M_M17	Mean Daily MVPA1 Bout Frequency - Matthews (min/day ct>=760, 8/10 min)	[Numeric]
BDMVPA1M_M17	Mean Daily MVPA1 Bout Duration - Matthews (min/day ct>=760, 8/10 min)	[Numeric]
BFMVPA2M_M17	Mean Daily MVPA2 Bout Frequency - Matthews (min/day ct>=1952, 8/10 min)	[Numeric]
BDMVPA2M_M17	Mean Daily MVPA2 Bout Duration - Matthews (min/day ct>=1952, 8/10 min)	[Numeric]
BFVIGM_M17	Mean Daily Vigorous Int Bout Frequency - Matthews (min/day ct>=5725, 8/10 min)	[Numeric]
BDVIGM_M17	Mean Daily Vigorous Int Bout Duration - Matthews (min/day ct>=5725, 8/10 min)	[Numeric]
BFMVPAF_M17	Mean Daily MVPA Bout Frequency - Freedson (min/day ct>=1952, 8/10 min)	[Numeric]

Variable	Label	Codes
BDMVPAF_M17	Mean Daily MVPA Bout Duration - Freedson (min/day ct>=1952, 8/10 min)	[Numeric]
BFVIGF_M17	Mean Daily Vigorous Int Bout Frequency - Freedson (min/day ct>=5725, 8/10 min)	[Numeric]
BDVIGF_M17	Mean Daily Vigorous Int Bout Duration - Freedson (min/day ct>=5725, 8/10 min)	[Numeric]
BFMVPAN_M17	Mean Daily MVPA Bout Frequency - NHANES (min/day ct>=2020, 8/10 min)	[Numeric]
BDMVPAN_M17	Mean Daily MVPA Bout Duration - NHANES (min/day ct>=2020, 8/10 min)	[Numeric]
BFVIGN_M17	Mean Daily Vigorous Int Bout Frequency - NHANES (min/day ct>=5999, 8/10 min)	[Numeric]
BDVIGN_M17	Mean Daily Vigorous Int Bout Duration - NHANES (min/day ct>=5999, 8/10 min)	[Numeric]
BFMVPAVM_M17	Mean Daily MVPA Bout Frequency - VM (min/day ct>=2075, 8/10 min)	[Numeric]
BDMVPAVM_M17	Mean Daily MVPA Bout Duration - VM (min/day ct>=2075, 8/10 min)	[Numeric]
GE10DFLG17	Flag: Monitor Worn >=10 Days	0 = Not Flagged 1 = Flagged
WAKE18A17	Flag: Monitor Worn >18 hrs/day on Average	0 = Not Flagged 1 = Flagged
FLG30HZ17	Flag: Data Collected at 30 Hz Sampling Rate	0 = Not Flagged 1 = Flagged
Sleep Variables		
TRP_MEAN17	Mean of Total Time in Bed	[Numeric]
MFI_MEAN17	Mean of Movement and Fragmentation Index	[Numeric]
TST_MEAN17	Mean of Total Sleep Time	[Numeric]
SE_MEAN17	Mean of Sleep Efficiency	[Numeric]
WASO_MEAN17	Mean of Wake after Sleep Onset	[Numeric]
SOL_MEAN17	Mean of Sleep Onset Latency	[Numeric]
SM_MEAN17	Mean of Sleep Maintenance	[Numeric]
TRP_SD17	Standard Deviation of Total Time in Bed	[Numeric]
MFI_SD17	Standard Deviation of Movement and Fragmentation Index	[Numeric]
TST_SD17	Standard Deviation of Total Sleep Time	[Numeric]
SE_SD17	Standard Deviation of Sleep Efficiency	[Numeric]
WASO_SD17	Standard Deviation of Wake after Sleep Onset	[Numeric]
SOL_SD17	Standard Deviation of Sleep Onset Latency	[Numeric]
SM_SD17	Standard Deviation of Sleep Maintenance	[Numeric]
SLEEPMIDPT_MEAN17	Average Sleep Midpoint	[Numeric]
SLEEPMIDPT_SD17	SD of Sleep Midpoint	[Numeric]
COUNT17	Total # of Valid Nights Used for Calculating Average Values	[Numeric]
NUM_WEEKDAY17	# of Valid Weekdays Nights Used for Calculating Average Values	[Numeric]
NUM_WEEKENDS17	# of Valid Weekends Nights Used for Calculating Average Values	[Numeric]
SLEEP_START_MEAN17	Mean of Sleep Start Time	[Numeric]
SLEEP_END_MEAN17	Mean of Sleep End Time	[Numeric]
REST_START_MEAN17	Mean of Rest Start Time	[Numeric]
REST_END_MEAN17	Mean of Rest End Time	[Numeric]

Variable	Label	Codes
SLEEP_START_SD17	SD of Sleep Start Time	[Numeric]
SLEEP_END_SD17	SD of Sleep End Time	[Numeric]
REST_START_SD17	SD of Rest Start Time	[Numeric]
REST_END_SD17	SD of Rest End Time	[Numeric]
TRP_NAP_MEAN17	Mean of Total Nap Time in Bed	[Numeric]
TST_NAP_MEAN17	Mean of Scored Total Sleep Time for Naps	[Numeric]
TRP_NAP_SD17	Standard Deviation of Total Nap Time in Bed	[Numeric]
TST_NAP_SD17	Standard Deviation of Scored Total Sleep Time for Naps	[Numeric]
NUM_NAPS_M17	Mean Total # of Naps Taken	[Numeric]
NUM_NAPS_SD17	Standard Deviation of Total # of Naps Taken	[Numeric]

EXPLANATION OF WEEKLY ACTIVITY VARIABLES AND SUMMARIES

Standard variables:

TOT10D_S17 = Total number of days when the monitor was worn for ≥ 10 hours.
OBSMIN_M17 = Average wear time across all days when the monitor was worn ≥ 10 hours.
TOTCTD_M17 = Average total activity counts across all days when the monitor was worn ≥ 10 hours.
TOTVM_M17 = Average total Vector Magnitude counts across all days when the monitor was worn ≥ 10 hours.
MEANCTD_M17 = Average of the mean daily activity counts per minute across all days when the monitor was worn ≥ 10 hours.
MEANVM_M17 = Average of the mean daily Vector Magnitude counts per minute across all days when the monitor was worn ≥ 10 hours.

Freedson cut points:

Variable	Description
LITEF_M17	Mean daily minutes of light intensity activity where accelerometer count/cut-points = 100-1951.
MODF_M17	Mean daily minutes of moderate intensity activity where accelerometer count/cut-points = 1952-5724.
MODF_S17	Total number of minutes spent in moderate intensity activity over all days with valid wear data where accelerometer count/cut-points = 1952-5724.
VIGF_M17	Mean daily minutes of vigorous intensity activity where accelerometer count/cut-points ≥ 5725.
VIGF_S17	Total number of minutes spent in vigorous intensity activity over all days with valid wear data where accelerometer count/cut-points ≥ 5725.
MVPAF_M17	Mean daily minutes of MVPA intensity where accelerometer count/cut-points ≥ 1952.
MVPAF_S17	Total number of minutes spent in MVPA intensity over all days with valid wear data where accelerometer count/cut-points ≥ 1952.
BFMVPAF_M17	Mean daily bout frequency of MVPA intensity where at least 8 of 10 minutes in the bout have accelerometer count/cut-points ≥ 1952.
BDMVPAF_M17	Mean daily bout duration of MVPA intensity where at least 8 of 10 minutes in the bout have accelerometer count/cut-points ≥ 1952.
BFVIGF_M17	Mean daily bout frequency of vigorous intensity activity where at least 8 of 10 minutes in the bout have accelerometer count/cut-points ≥ 5725.
BDVIGF_M17	Mean daily bout duration of vigorous intensity activity where at least 8 of 10 minutes in the bout have accelerometer count/cut-points ≥ 5725.

Matthews cut points:

Variable	Description
LITEM_M17	Mean daily minutes of light intensity activity where accelerometer count/cut-points = 100-759.
MLIM_M17	Mean daily minutes of moderate lifestyle intensity activity where accelerometer count/cut-points = 760-1951.
MWIM_M17	Mean daily minutes of moderate walk intensity activity where accelerometer count/cut-points = 1952-5724.
MODM_M17	Mean daily moderate intensity activity where accelerometer count/cut-points = 760-5724.
MODM_S17	Total number of minutes spent in moderate intensity activity over all days with valid wear data where accelerometer count/cut-points = 760-5724.
VIGM_M17	Mean daily minutes of vigorous intensity activity where accelerometer count/cut-points ≥ 5725.
VIGM_S17	Total number of minutes spent in vigorous intensity activity over all days with valid wear data where accelerometer count/cut-points ≥ 5725.
MVPA1M_M17	Mean daily minutes of lower threshold MVPA activity where accelerometer count/cut-points ≥ 760.
MVPA1M_S17	Total number of minutes spent in lower threshold MVPA intensity over all days with valid wear data where accelerometer count/cut-points ≥ 760.

Variable	Description
MVPA2M_M17	Mean daily minutes of higher threshold MVPA activity where accelerometer count/cut-points ≥ 1952.
MVPA2M_S17	Total number of minutes spent in higher threshold MVPA intensity over all days with valid wear data where accelerometer count/cut-points ≥ 1952.
BFMVPA1M_M17	Mean daily bout frequency of lower threshold MVPA intensity where at least 8 of 10 minutes in the bout have accelerometer count/cut-points ≥ 760.
BDMVPA1M_M17	Mean daily bout frequency of lower threshold MVPA intensity where at least 8 of 10 minutes in the bout have accelerometer count/cut-points ≥ 760.
BFMVPA2M_M17	Mean daily bout frequency of higher threshold MVPA intensity where at least 8 of 10 minutes in the bout have accelerometer count/cut-points ≥ 1952.
BDMVPA2M_M17	Mean daily bout frequency of higher threshold MVPA intensity where at least 8 of 10 minutes in the bout have accelerometer count/cut-points ≥ 1952.
BFVIGM_M17	Mean daily bout frequency of vigorous intensity activity where at least 8 of 10 minutes in the bout have accelerometer count/cut-points ≥ 5725.
BDVIGM_M17	Mean daily bout frequency of vigorous intensity activity where at least 8 of 10 minutes in the bout have accelerometer count/cut-points ≥ 5725.

NHANES cut points:

Variable	Description
LITEN_M17	Mean daily minutes of light intensity activity where accelerometer count/cut-points = 100-2019.
MODN_M17	Mean daily moderate intensity activity where accelerometer count/cut-points = 2020-5998.
MODN_S17	Total number of minutes spent in moderate intensity activity over all days with valid wear data where accelerometer count/cut-points = 2020-5998.
VIGN_M17	Mean daily minutes of vigorous intensity activity where accelerometer count/cut-points ≥ 5999.
VIGN_S17	Total number of minutes spent in vigorous intensity activity over all days with valid wear data where accelerometer count/cut-points ≥ 5999.
MVPAN_M17	Mean daily minutes of MVPA intensity where accelerometer count/cut-points ≥2020.
MVPAN_S17	Total number of minutes spent in MVPA intensity over all days with valid wear data where accelerometer count/cut-points ≥ 2020.
BFMVPAN_M17	Mean daily bout frequency of MVPA intensity where at least 8 of 10 minutes in the bout have accelerometer count/cut-points ≥ 2020.
BDMVPAN_M17	Mean daily bout duration of MVPA intensity where at least 8 of 10 minutes in the bout have accelerometer count/cut-points ≥ 2020.
BFVIGN_M17	Mean daily bout frequency of vigorous intensity activity where at least 8 of 10 minutes in the bout have accelerometer count/cut-points ≥ 5999.
BDVIGN_M17	Mean daily bout frequency of vigorous intensity activity where at least 8 of 10 minutes in the bout have accelerometer count/cut-points ≥ 5999.

Evenson vector magnitude cut points:

Variable	Description
SEDVM_M17	Mean daily minutes of sedentary time where vector magnitude count/cut-points = 0-75.
LLITEVM_M17	Mean daily minutes of low-light intensity activity where vector magnitude count/cut-points = 76-903.
HLITEVM_M17	Mean daily minutes of high-light intensity activity where vector magnitude count/cut-points = 904-2075.
MVPAVM_M17	Mean daily minutes of MVPA intensity where vector magnitude count/cut-points ≥ 2075.
MVPAVM_S17	Total number of minutes spent in MVPA intensity over all days with valid wear data where vector magnitude count/cut-points ≥ 2075.
BFMVPAVM_M17	Mean daily bout frequency of MVPA intensity where at least 8 of 10 minutes in the bout have vector magnitude count/cut-points ≥ 2075.

Variable	Description
BDMVPAVM_M17	Mean daily bout duration of MVPA intensity where at least 8 of 10 minutes in the bout have vector magnitude count/cut-points ≥ 2075.

Additional weekly variables:

Variable	Description
NWPER_M17	Mean number of non-wear periods per day.
METF_M17	Mean daily METs according to the Freedson equation.
METS_M17	Mean daily METs according to the Schwartz equation.
BREAK_M17	Mean daily inactive-to-active transitions.
BREAKPH_M17	Mean daily inactive-to-active transitions per inactive hour.
INACT_M17	Mean daily sedentary minutes where accelerometer count < 100.
ACTIVE_M17	Mean daily active minutes where accelerometer count ≥ 100.

EXPLANATION OF SLEEP SUMMARY VARIABLES

- Total # of Valid Nights (**COUNT17**): Number of valid nights used for calculating average values, created by the available sleep records of each participant across the observational period.
- Total # of Naps Taken (**NUM_NAPS_M17**, **NUM_NAPS_SD17**) indicates the mean and standard deviation of number of naps taken across the entire observation.
- Mean and Standard Deviation of Total Sleep Time (**TST_MEAN17** and **TST_SD17**): Total Sleep Time is calculated by the total number of epochs between start time and end time of given interval scored as SLEEP multiplied by the Epoch Length in minutes (default is one minute epochs). The mean and standard deviation were then created.
- Mean and Standard Deviation of Total Time in Bed (**TRP_MEAN17** and **TRP_SD17**): Total Time in Bed is calculated by the Start Time and End time of each daily primary rest interval. The mean and standard deviation of rest duration were then created and included in the final dataset.
- Mean and Standard Deviation of Total Nap Time (**TST_NAP_MEAN17** and **TST_NAP_SD17**): Total Nap Time is calculated by the total number of epochs between Start Time and End Time of each daily primary interval scored as SLEEP multiplied by the Epoch Length in minutes. The mean and standard deviation of sleep total were then created and included in the final dataset. For women who only reported one nap, their standard deviation of total nap time was set to missing.
- Mean and Standard Deviation of Total Nap Time Based (**TRP_NAP_MEAN17** and **TRP_NAP_SD17**): Total Nap Time is calculated by the Start Time and End time of the given rest interval. The mean and standard deviation of rest duration were then created and included in the final dataset. For women who only reported one nap, their standard deviation of total nap time was set to missing.
- Mean and Standard Deviation of Movement and Fragmentation Index (**MFI_MEAN17** and **MFI_SD17**): Movement and Fragmentation Index is a composite measure of sum of two percentages and was calculated based on immobile and mobile values for each primary interval. The mean and standard deviation of the movement and fragmentation index were then created and included in the final dataset.
- Mean and Standard Deviation of Sleep Onset Latency (**SOL_MEAN17** and **SOL_SD17**): Sleep Onset Latency is the time elapsed between the Start Time of the given Rest Interval and the following Sleep Start Time, in minutes. The mean and standard deviation of sleep onset latency were then created and included in the final dataset.
- Mean and Standard Deviation of Sleep Efficiency (**SE_MEAN17** and **SE_SD17**): Sleep Efficiency is the percentage of Scored Total Sleep Time to the Rest Interval Duration calculated for each primary interval. The mean and standard deviation of sleep efficiency were then created and included in the final dataset.
- Mean and Standard Deviation of Sleep Maintenance (**SM_MEAN17** and **SM_SD17**): Sleep Maintenance is the percentage of Total Sleep Time to the time in minutes between Sleep Start and Sleep End for the Sleep Interval calculated for each primary interval. The mean and standard deviation of sleep maintenance were then created and included in the final dataset.
- Mean and Standard Deviation of Wake after Sleep Onset (**WASO_MEAN17** and **WASO_SD17**): Wake after Sleep Onset is the total number of epochs between the Start Time and the End Time of each daily primary SLEEP Interval scored as WAKE by the software multiplied by the epoch length in minutes. The mean and standard deviation of wake after sleep onset were then created and included in the final dataset.
- Mean and Standard Deviation of Sleep Midpoint (**SLEEPMIDPT_MEAN17** and **SLEEPMIDPT_SD17**): The means and standard deviations of the sleep midpoint were created and included in the final dataset in numeric format and centered around midnight. For each participant, the mean sleep midpoint was calculated across all nights of valid data. The standard deviation of the sleep midpoint was calculated across all nights of valid data and provides a measure of sleep regularity; higher values indicate more irregularity in sleep timing.
- Total # of Weeknights (**NUM_WEEKDAY17**): The # of valid nights used for calculating summarized values that were 'weeknights' (Sun, Mon, Tues, Wed, Thurs).
- Total # of weekend (**NUM_WEEKENDS17**): The # of valid nights used for calculating summarized values that were 'weekend' nights (Fri, Sat) .
- Mean and Standard Deviation of Rest Start (**REST_START_MEAN17** and **REST_START_SD17**): The start time of each primary rest interval corresponds to the time the participant got into bed and attempted to sleep (i.e., bedtime). The mean and standard deviation of rest start were created from Rest Start Time in numeric format and centered around midnight. For example: a mean bedtime of 23:00 (11:00 PM) is conveyed as -1.00.

- Mean and Standard Deviation of Rest End (**REST_END_MEAN17** and **REST_END_SD17**): The end time of each primary rest interval corresponds to the time the participant got out of bed (i.e., rise time). The mean and standard deviation of rest end were created from Rest End Time in numeric format and centered around midnight. For example: a mean rest end time of 07:00 (7:00 AM) is conveyed as 7.00.
- Mean and Standard Deviation of Sleep Start (**SLEEP_START_MEAN17** and **SLEEP_START_SD17**): The start time of each primary sleep interval corresponds to the time the participant started sleeping (i.e., sleep onset). The mean and standard deviation of sleep start were created from Sleep Start Time in numeric format and centered around midnight. For example: a mean sleep start time of 23:00 (11:00 PM) is conveyed as -1.00.
- Mean and Standard Deviation of Sleep End (**SLEEP_END_MEAN17** and **SLEEP_END_SD17**): The end time of each primary sleep interval corresponds to the time the participant ended their sleep (i.e., sleep offset). The mean and standard deviation of sleep end were created from Sleep End Time in numeric format and centered around midnight. For example: a mean sleep end time of 07:00 (7:00 AM) is conveyed as 7.00.

DATA COLLECTION FORMS

 # = Variable excluded from public use datafile
~ A randomly generated ID will be provided that is different from the original ID
† This date is given in days since the initial baseline interview, which is day zero

Date Data Entered / Initials _____ Date Verified / Initials _____

ACTIGRAPHY ENROLLMENT FORM

Study of Women's Health Across the Nation

SECTION A. GENERAL INFORMATION

AFFIX ID LABEL HERE

A1. RESPONDENT ID: **ARCHID~**

A2. SWAN STUDY VISIT # 17 **VISIT**

A3. FORM VERSION: 12/23/2020 **#FORM_V**

A4. DATE FORM COMPLETED: ____ ____ / ____ ____ / ____ ____ ____ ____ **DCOMPDAY†**
M M D D Y Y Y Y

A5. INTERVIEWER'S INITIALS: _____ _____ _____ **#INITS**

A6. RESPONDENT'S DOB: ___ ___ / ___ ___ / 1 9 ___ ___ **#DOB**
M M D D Y Y Y Y

VERIFY WITH RESPONDENT

A.7. DID THE PARTICIPANT AGREE TO WEAR AT LEAST ONE OF THE ACTIGRAPHY DEVICES?
#ONEACT17
NO 1
YES 2 **B1**

A7.1 REASON WHY THE PARTICIPANT DID NOT AGREE (i.e. REFUSED BOTH DEVICES)
#ONEACTNO17
NOT APPROACHED/NO ACTIWATCH OR WGT3X AVAILABLE ..... 1 **END**
UNABLE TO COMPLY WITH PROTOCOL ..... 2 **END**
OTHER ..... 3 **END**
IF OTHER, SPECIFY **#ONEACTNS17**_____
REFUSED ..... -7 **END**

SECTION B. DEVICES PROVIDED TO PARTICIPANT

ACTIWATCH (SLEEP)

B1. DID THE PARTICIPANT AGREE TO WEAR THE ACTIWATCH? **WATCHGIV17**
NO.....1 **B4**
YES.....2

B2. RECORD ACTIWATCH SERIAL ID: B ___ ___ ___ ___ **#WATCHID17**

B3. ACTIWATCH GIVEN/MAILED TO PARTICIPANT ON: ___ ___ / ___ ___ / ___ ___ ___ ___
DGACT1DAY7† M M D D Y Y Y Y

ACTIGRAPH WGT3X (ACTIVITY)

B4. DID THE PARTICIPANT AGREE TO WEAR THE ACTIGRAPH WGT3X? **WGT3XGIV17**
NO.....1 **END SECTION B**
YES.....2

B5. RECORD WGT3X NUMBER **#WGT3XNUM17**
(SITE NUMBER – 01 THRU 20): ___ ___ – ___ ___

B6. WGT3X GIVEN/MAILED TO PARTICIPANT ON: ___ ___ / ___ ___ / ___ ___ ___ ___
DGWGTDAY17† M M D D Y Y Y Y

SECTION C. RETURN OF DEVICES AND DIARY

ACTIWATCH (SLEEP)

C1. WAS THE ACTIWATCH RETURNED? **ACTIWRET17**

NO (ALL EFFORTS TO OBTAIN HAVE BEEN EXHAUSTED).....1 **C2**
YES.....2
PENDING 3
N/A: DID NOT AGREE TO WEAR.....4 **C2**

C1.1. ACTIWATCH RETURNED ON: ___ ___ / ___ ___ / ___ ___ ___ ___ **DRACTDAY17†**
M M D D Y Y Y Y

ACTIGRAPH WGT3X (ACTIVITY)

C2. WAS THE WGT3X RETURNED? **WGT3XRET17**

NO (ALL EFFORTS TO OBTAIN HAVE BEEN EXHAUSTED).....1 **C3**
YES.....2
PENDING 3
N/A: DID NOT AGREE TO WEAR……..4 **C3**

C2.1. WGT3X RETURNED ON: **DRWGTDAY17†** ___ ___ / ___ ___ / ___ ___ ___ ___
M M D D Y Y Y Y

DIARY

C3. WAS THE SLEEP DIARY RETURNED? **DIARYRET17**

NO 1
YES.....2
PENDING 3