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Advancing movement & sleep research

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GGIR training: Day 3

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Slide deck version: 06 December 2022

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DECLARATION

- We will answer your questions in the question time, **NOT** in the chat, so that you can focus on the presentation (but questions are welcome in the chat)
- We will have 3 short breaks today
- We will **NOT** record the video session
- Please do **NOT** record this training and share publicly
- Slides are available as PDF => https://www.accelting.com/ggir-training/

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What will we do today?

1. Recap & questions
2. Practice time
3. Lecture
   1. GGIR part 5
   2. Reflections on cut-points and bouts
   3. Other variables
   4. Part 5 output
   5. The config file
   6. Looking for help
4. Questions & Discussion

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Assignment 3 (build on assignment 2 script)

Download sleeplog: https://bit.ly/3gIuxDF

1. Run GGIR parts 3 and 4 using:
   - Detect SIBs with the "vanHees2015" algorithm
   - Detect SPT with the "HDCZA" algorithm
2. Copy results/part4_nightsummary_clean.csv to a different folder
3. Run GGIR parts 3 and 4 again using:
   - Reported sleeplog information:
   - Download sleeplog: https://github.com/Accelting/trainingmaterials/tree/main/sleeplog
   - Tip 1: make sure the ID in the sleeplog matches the ID in the GGIR output datasets
   - Tip 2: is the ID numeric? Check the sleeplogidnum argument
4. Compare the nightsummary output from the HDCZA and the sleeplog

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Full-day time-use analysis

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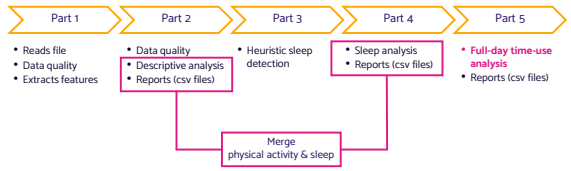
The GGIR pipeline



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Part 5: Full-day time use

What it does

- Loads imputed acceleration data from part 2
- Loads sleep information from part 4 (SPT windows)
- Re-calculate variables based on the merged data (split by SPT & waking hours)
- Part 5 reports includes:
  - Daytime variables: physical activity intensities, inactivity
  - Nighttime variables: sleep indicators

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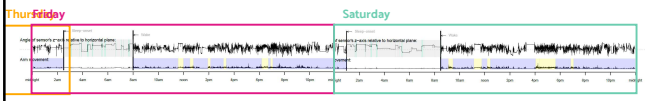
Part 5: Full-day time use

Daily window definition

- Definition of day duration
  - Midnight-to-midnight
    - dayborder = 3 am → Same as in part 2
  - Waking-up to waking up



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Part 5: Full-day time use

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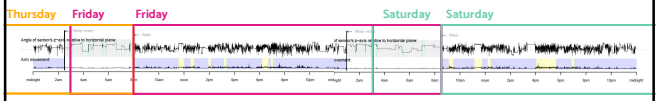

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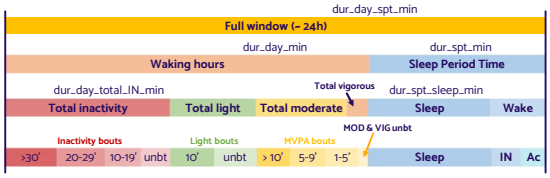
Part 5: Full-day time use



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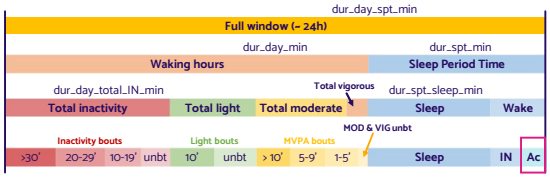
Part 5: Full-day time use



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Part 5: Full-day time use

Recalculated variables

- Average acceleration
- Bouts of MVPA

Why MVPA minutes do not exactly match in part 2 and part 5?

- Maybe different window definition
- Activity minutes occurring during SPT
- Bouts calculation ↔ Full-day window definition
- Re-definition of epoch length? → part5_agg2_60seconds = TRUE

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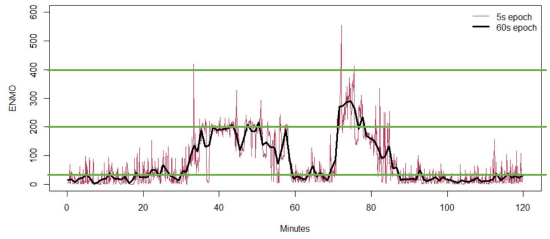
Epoch length in part 5

```
GGIR(# general settings
  [...]
  # data quality and metrics
  windowsizes = c(5, 900, 3600),
  part5_agg2_60sec = TRUE,
  [...])
```



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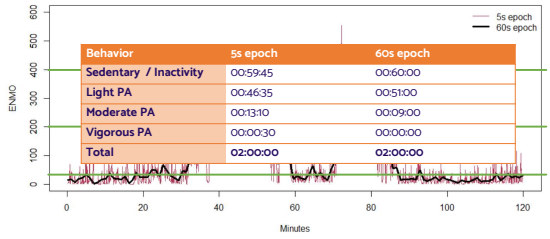
Epoch length in part 5

```
GGIR(# general settings
  [...]
  # data quality and metrics
  windowsizes = c(5, 900, 3600),
  part5_agg2_60sec = TRUE,
  [...])
```



Behavior	5s epoch	60s epoch
Sedentary / Inactivity	00:59:45	00:60:00
Light PA	00:46:35	00:51:00
Moderate PA	00:13:10	00:09:00
Vigorous PA	00:00:30	00:00:00
Total	**02:00:00**	**02:00:00**

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Part 5: Full-day time use

New variables (not in part 2)

- Inactivity
- Light physical activity
- Moderate physical activity
- Vigorous physical activity
- Bouts of inactivity and light physical activity

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The GGIR()

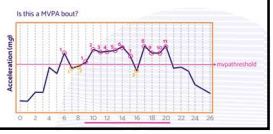
Full-day time-use analysis

```
GGIR(
  [...]
  # Physical activity and Inactivity thresholds
  threshold.lig = 40, threshold.mod = 100, threshold.vig = 400,

  # It can be more than one threshold
  threshold.lig = c(20, 40), threshold.mod = c(100, 120), threshold.vig = 400,

  # Bout durations
  boutdur.in = c(10, 20, 30), boutdur.lig = 10, boutdur.mvpa = c(1, 5, 10),

  # Fraction of a bout that needs to meet the thresholds
  boutcriter.in = 0.9, boutcriter.lig = 0.8, boutcriter.mvpa = 0.8,
  [...])
```



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?

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Cut-points & Bouts

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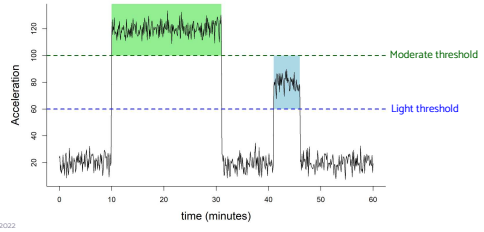
Physical activity intensity: cut-points

1. Time above threshold



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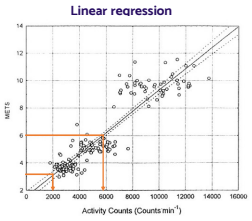
Physical activity intensity



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Part 2 and 5: Time spent in MVPA

- Traditionally threshold based => not perfect, but 'easy'
- Energy expenditure estimation should account for:
  - Body acceleration
  - Body weight (+ composition if possible)
  - Activity type
- Hundreds of publications tried to do better than threshold method, but remains difficult

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Defining what a bout/sojourn is

1. What should the cut-point be?
2. What should the epoch length be?
3. What should minimum duration of bout (sojourn) be?
4. Should we allow for gaps in a bout (sojourn)?
5. Should this be a percentage of the bout duration, an absolute minimum in seconds, or both?
6. Are bout gaps counted towards the time spent in bouts?
7. Do the first and last epoch need to meet the threshold criteria?
8. In what order are the bouts extracted?
9. How many bout categories should there be?

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

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Implementation in GGIR

User decides on:

- Acceleration thresholds for light, moderate, and vigorous intensity
- Fraction of time for which cut-point criteria need to be met (light, inactive, MVPA)
- Bout duration ranges, e.g. [1, 5) [5, 10) and [10, ∞) minutes
- Epoch length

User does NOT decide on:

- Maximum bout gap of 1 minute
- First and last epoch need to meet cut-point criteria
- Number of intensity levels, which are always: inactive, light and MVPA
- Order in which bouts are calculated (1 MVPA; 2 inactive; 3 Light)
- Default code for detecting bout: https://github.com/wadpac/GGIR/blob/master/R/g.getbout.R -> where bout.metric = 6

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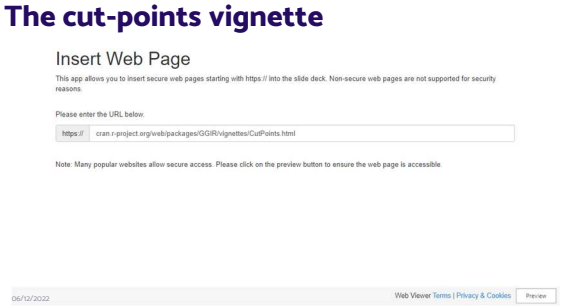
The cut-points vignette



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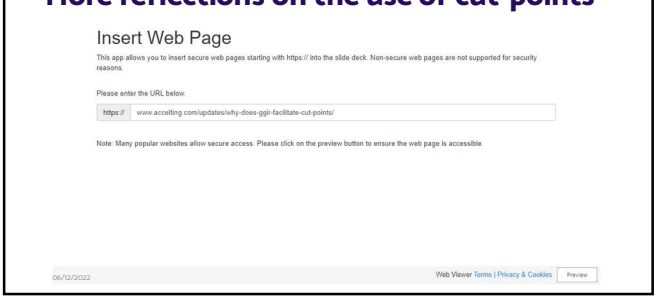
More reflections on the use of cut-points



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Part 5 Output

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The GGIR pipeline

Part 1	Part 2	Part 3	Part 4	Part 5
• Reads file • Data quality • Extracts features	• Data quality • Descriptive analysis • Reports (csv files)	• Heuristic sleep detection	• Sleep analysis • Reports (csv files)	• Full-day time-use analysis • **Reports (csv files)**

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Part 5

Output

- meta
  - ms5.outraw
    - 40_100_400
      - 101.RData
      - 101.csv
    - behavioralcodes_YYYY-MM-DD.csv
- results
  - file summary reports
    - Report_101.pdf
  - QC
    - part5_daysummary_full_MM_L40M100V400_T5A5.csv
  - part5_daysummary_MM_L40M100V400_T5A5.csv
  - part5_personsummary_MM_L40M100V400_T5A5.csv

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Part 5

Output

- meta
  - ms5.outraw
    - 40_100_400
      - 101_T5A5.Rdata
      - 101_T5A5.csv
    - behavioralcodes_YYYY-MM-DD.csv
- results
  - file summary reports
    - Report_101.pdf
  - QC
    - **part5_daysummary_full_MM_L40M100V400_T5A5.csv**
  - **part5_daysummary_MM_L40M100V400_T5A5.csv**
  - part5_personsummary_MM_L40M100V400_T5A5.csv

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Output from Part 5

Day-level features (full report)

do.report = 5

```
GGIR(
  [...]
  # Data cleaning
  includedaycrit.part5 = 2/3,
  [...])
```

66% of the waking hours available (wearing the device)

part5_daysummary_full_MM_L40M100V400_T5A5.csv

ID	window_number	weekday	calendar_date	cleaningcode	acc_available	guider	nonwear_perc_day	nonwear_perc_spt	nonwear_perc_day_spt
1	1	Saturday	7/7/2014	0	1	sleeplog	3	84	30
1	2	Sunday	8/7/2014	1	1	HDCZA	0	0	0
1	3	Monday	9/7/2014	0	1	sleeplog	0	0	0
1	4	Tuesday	10/7/2014	0	1	sleeplog	0	0	0
1	5	Wednesday	11/7/2014	0	1	sleeplog	10	0	6.667
1	6	Thursday	12/7/2014	0	1	sleeplog	0.4	0	0.267
1	7	Friday	13/7/2014	2	1	sleeplog	68	0	45.334

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Output from Part 5

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Output from Part 5

Day-level features (full report)

do.report = 5

```
GGIR(
  [...]
  # Data cleaning
  includedaycrit.part5 = 2/3,
  excludefirstlast.part5 = FALSE,
  [...])
```

part5_daysummary_MM_L40M100V400_T5A5.csv

ID	window_number	weekday	calendar_date	cleaningcode	acc_available	guider	nonwear_perc_day	nonwear_perc_spt	nonwear_perc_day_spt
1	1	Saturday	7/7/2014	0	1	sleeplog	3	84	30
1	2	Sunday	8/7/2014	1	1	HDCZA	0	0	0
1	3	Monday	9/7/2014	0	1	sleeplog	0	0	0
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1	6	Thursday	12/7/2014	0	1	sleeplog	0.4	0	0.267

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Output from Part 5

Day-level features (full report)

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```
GGIR(
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  excludefirstlast.part5 = TRUE,
  [...])
```

part5_daysummary_MM_L40M100V400_T5A5.csv

ID	window_number	weekday	calendar_date	cleaningcode	acc_available	guider	nonwear_perc_day	nonwear_perc_spt	nonwear_perc_day_spt
1	1	Saturday	7/7/2014	0	1	sleeplog	3	84	30
1	2	Sunday	8/7/2014	1	1	HDCZA	0	0	0
1	3	Monday	9/7/2014	0	1	sleeplog	0	0	0
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Part 5

Output

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  - ms5.outraw
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      - 101_T5A5.csv
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- results
  - file summary reports
    - Report_101.pdf
  - QC
    - part5_daysummary_full_MM_L40M100V400_T5A5.csv
  - part5_daysummary_MM_L40M100V400_T5A5.csv
  - **part5_personsummary_MM_L40M100V400_T5A5.csv**

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Output from Part 5

Person-level features (time-use)

do.report = 5

part5_personsummary_MM_L40M100V400_T5A5.csv

ID	Calendar_date	Nvaliddays	Nvalliddays_WD	Nvalliddays_WE	Ndaysleeper	Ncleaningcodezero	Ncleaningcode1	Nsleeplog_used	Nacc_available
11	24/08/2022	6	4	2	0	5	1	5	6

Plain avg

ID	nonwear_perc_day_pla	dur_spt_sleep_min_pla	dur_day_IN_unbt_min_pla	dur_day_MOD_unbt_min_pla	dur_day_VIG_unbt_min_pla	dur_day_MVPA_bts_5_10_min_pla	dur_day_MVPA_bts_5_10_min_pla	dur_day_total_MOD_min_pla	dur_day_total_VIG_min_pla
11	0	325.306	230.986	49.375	0.319	2.806	2.681	72.597	0.514

Weighted avg

ID	nonwear_perc_day_wei	dur_spt_sleep_min_wei	dur_day_IN_unbt_min_wei	dur_day_MOD_unbt_min_wei	dur_day_VIG_unbt_min_wei	dur_day_MVPA_bts_10_min_wei	dur_day_MVPA_bts_5_10_min_wei	dur_day_total_MOD_min_wei	dur_day_total_VIG_min_wei
11	0	327.58	231.009	49.107	0.298	3.006	2.693	72.952	0.497

week_weekend_aggregate.part5 = TRUE

Weekday & weekend avg

ID	nonwear_perc_day_WD	dur_spt_sleep_min_WD	dur_day_IN_unbt_min_WD	dur_day_MOD_unbt_min_WD	dur_day_VIG_unbt_min_WD	dur_day_MVPA_bts_10_min_WD	dur_day_MVPA_bts_5_10_min_WD	dur_day_total_MOD_min_WD	dur_day_total_VIG_min_WD
11	0	341.229	231.146	47.5	0.167	4.208	2.771	75.083	0.396

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Output from Part 5

Person-level features (acceleration)

do.report = 5

part5_personsummary_MM_L40M100V400_T5A5.csv

ID	Calendar_date	Nvalliddays	Nvalliddays_WD	Nvalliddays_WE	Ndaysleeper	Ncleaningcodezero	Ncleaningcode1	Nsleeplog_used	Nacc_available
11	24/08/2022	6	4	2	0	5	1	5	6

Plain avg

ID	ACC_day_total_IN_mg_pla	ACC_day_total_LIG_mg_pla	ACC_day_total_MOD_mg_pla	ACC_day_total_VIG_mg_pla	ACC_day_mg_pla	ACC_spt_mg_pla	ACC_day_spt_mg_pla
11	12.312	64.438	140.033	497.212	34.072	20.446	30.437

Weighted avg

ID	ACC_day_total_IN_mg_wei	ACC_day_total_LIG_mg_wei	ACC_day_total_MOD_mg_wei	ACC_day_total_VIG_mg_wei	ACC_day_mg_wei	ACC_spt_mg_wei	ACC_day_spt_mg_wei
11	12.224	64.535	139.877	495.554	34.114	20.101	30.366

week_weekend_aggregate.part5 = TRUE

Weekday & weekend avg

ID	ACC_day_total_IN_mg_WD	ACC_day_total_LIG_mg_WD	ACC_day_total_MOD_mg_WD	ACC_day_total_VIG_mg_WD	ACC_day_mg_WD	ACC_spt_mg_WD	ACC_day_spt_mg_WD
11	11.694	65.119	138.941	485.61	34.365	18.034	29.945

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Output from Part 5

Other variables

NIGHTTIME
- N_atleast5minwakenight
- Nblocks
- dur_spt_wake_IN_min
- dur_spt_wake_LIG_min
- dur_spt_wake_MOD_min
- dur_spt_wake_VIG_min

DAYTIME
- Nbouts
- Nblocks

FULL WINDOW
- quantile_mostactive60min_mg_pla
- quantile_mostactive30min_mg_pla
- L5VALUE_pla
- M5VALUE_pla
- L5TIME_num_pla
- M5TIME_num_pla
- ig_gradient_pla
- ig_intercept_pla
- ig_rsquared_pla
- Fragmentation metrics

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Output from Part 5

Other variables

NIGHTTIME
- N_atleast5minwakenight
- Nblocks
- dur_spt_wake_IN_min
- dur_spt_wake_LIG_min
- dur_spt_wake_MOD_min
- dur_spt_wake_VIG_min

DAYTIME
- Nbouts
- Nblocks

FULL WINDOW
- quantile_mostactive60min_mg_pla
- quantile_mostactive30min_mg_pla
- L5VALUE_pla
- M5VALUE_pla
- L5TIME_num_pla
- M5TIME_num_pla
- ig_gradient_pla
- ig_intercept_pla
- ig_rsquared_pla
- Fragmentation metrics

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Output from Part 5

Other variables

NIGHTTIME
- N_atleast5minwakenight
- Nblocks
- dur_spt_wake_IN_min
- dur_spt_wake_LIG_min
- dur_spt_wake_MOD_min
- dur_spt_wake_VIG_min

DAYTIME
- Nbouts
- Nblocks

FULL WINDOW
- quantile_mostactive60min
- quantile_mostactive30min
- L5VALUE
- M5VALUE
- L5TIME_num
- M5TIME_num
- ig_gradient
- ig_intercept
- ig_rsquared
- Fragmentation metrics → frag.metrics="all"

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Output from Part 5

Fragmentation metrics

Nr. Of fragments
- FRAG_Nfrag_IN_day
- FRAG_Nfrag_LIPA_day
- FRAG_Nfrag_MVPA_day
- FRAG_Nfrag_PA_day
- FRAG_Nfrag_IN2LIPA_day
- FRAG_Nfrag_IN2MVPA_day

Transition probability
- FRAG_TP_PA2IN_day
- FRAG_TP_IN2PA_day
- FRAG_TP_IN2LIPA_day
- FRAG_TP_IN2MVPA_day

Mean duration
- FRAG_mean_dur_IN_day
- FRAG_mean_dur_LIPA_day
- FRAG_mean_dur_MVPA_day
- FRAG_mean_dur_PA_day

Indices
- Gini
- CoV
- Alpha
- ...

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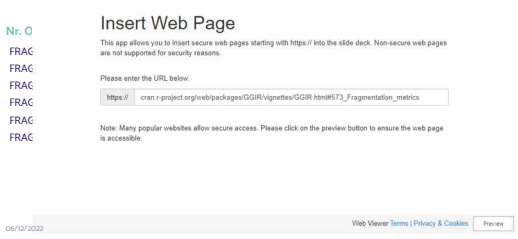
Output from Part 5

Fragmentation metrics



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Part 5

Output

- meta
  - ms5.outraw
    - 40_100_400
      - **101_T5A5.Rdata**
      - **101_T5A5.csv**
    - behavioralcodes_YYYY-MM-DD.csv
- results
  - file summary reports
    - Report_101.pdf
  - QC
    - part5_daysummary_full_MM_L40M100V400_T5A5.csv
  - part5_daysummary_MM_L40M100V400_T5A5.csv
  - part5_personsummary_MM_L40M100V400_T5A5.csv

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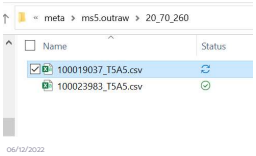
Output from Part 5

Epoch-level features

save_ms5rawlevels = TRUE *# default = FALSE!!*
save_ms5raw_format = "csv" *# default = "RData"*
save_ms5raw_without_invalid = FALSE
 # default = TRUE



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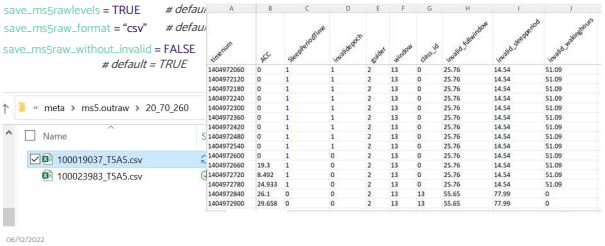
Output from Part 5

Epoch-level features

save_ms5rawlevels = TRUE *# default*
save_ms5raw_format = "csv" *# default*
save_ms5raw_without_invalid = FALSE
 # default = TRUE



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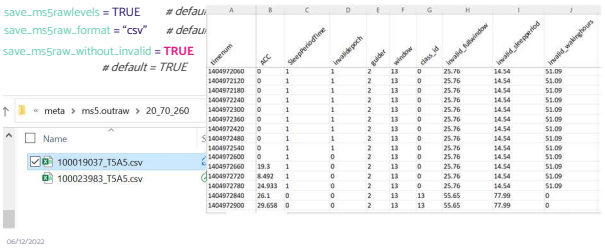
Output from Part 5

Epoch-level features

save_ms5rawlevels = TRUE *# default*
save_ms5raw_format = "csv" *# default*
save_ms5raw_without_invalid = **TRUE**
 # default = TRUE



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Part 5

Output

- meta
  - ms5.outraw
    - 40_100_400
      - 101_T5A5.Rdata
      - 101_T5A5.csv
    - **behavioralcodes_YYYY-MM-DD.csv**
- results
  - file summary reports
    - Report_101.pdf
  - QC
    - part5_daysummary_full_MM_L40M100V400_T5A5.csv
  - part5_daysummary_MM_L40M100V400_T5A5.csv
  - part5_personsummary_MM_L40M100V400_T5A5.csv

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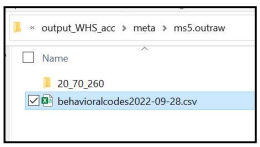
Output from Part 5

Epoch-level features

save_ms5rawlevels = TRUE *# default = FALSE!!*
save_ms5raw_format = "csv" *# default = "RData"*
save_ms5raw_without_invalid = TRUE



	A	B
	class_name	class_id
	spt_sleep	0
	spt_wake_IN	1
	spt_wake_LIG	2
	spt_wake_MOD	3
	spt_wake_VIG	4
	day_IN_unbt	5
	day_LIG_unbt	6
	day_MOD_unbt	7
	day_VIG_unbt	8
	day_MVPA_bts_10	9
	day_MVPA_bts_5_10	10
	day_IN_bts_60	11
	day_IN_bts_30_60	12
	day_LIG_bts_30	13
	day_LIG_bts_10_30	14

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Part 5

Output

- meta
  - ms5.outraw
    - 40_100_400
      - 101_T5A5.Rdata
      - 101_T5A5.csv
    - behavioralcodes_YYYY-MM-DD.csv
- results
  - file summary reports
    - **Report_101.pdf**
  - QC
    - part5_daysummary_full_MM_L40M100V400_T5A5.csv
  - part5_daysummary_MM_L40M100V400_T5A5.csv
  - part5_personsummary_MM_L40M100V400_T5A5.csv

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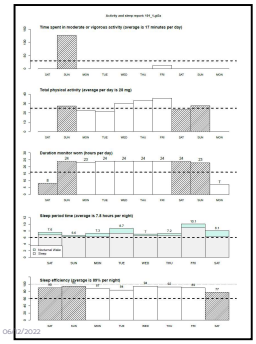

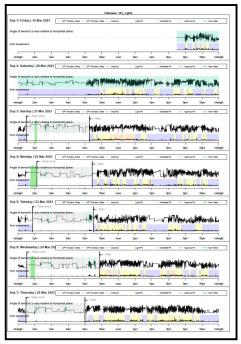

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Other variables

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Other variables

Cyrcadian rhythm - documentation

IVIS.activity.metric = 2

Circadian Rest–Activity Rhythm Disturbances in Alzheimer's Disease

Eus J.W. van Someren, Eveline E.O. Hagebeuk, Cees Lijzenga, Philip Scheltens, Sophie E.J.A. de Rooij, Cees Jonker, Anne-Margriet Pot, Majid Mirmiran, and Dick F. Swaab

https://link.springer.com/content/pdf/10.1007/s12561-019-09236-4.pdf

cosinor

Statistics in Biosciences (2019) 11:371–402
https://doi.org/10.1007/s12561-019-09236-4

Joint and Individual Representation of Domains of Physical Activity, Sleep, and Circadian Rhythmicity

Junrui Di, et al. *(full author details at the end of the article)*

Received: 18 December 2017 / Revised: 7 March 2019 / Accepted: 2 April 2019 / Published online: 15 April 2019
© International Chinese Statistical Association 2019

https://link.springer.com/content/pdf/10.1007/s12561-019-09236-4.pdf

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Other variables

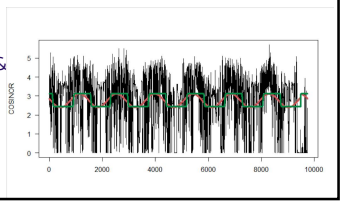
Circadian rhythms

- MXLX – Most and Least active X hours
  - Average acceleration
  - Start time
  - Intensity gradient
- IV & IS – Intradaily Variability &
- Cosinor

Part 2 & 5

Part 2

```
GGIR(
  [...]
  # Circadian rhythms
  winhr = c(5, 10),
  IVIS.activity.metric = 2
  IVIS_acc_threshold = 20
  cosinor = TRUE,
  [...])
```



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Vignette

Insert Web Page

This app allows you to insert secure web pages starting with https:// into the slide deck. Non-secure web pages are not supported for security reasons.

Please enter the URL below:

https:// cran.r-project.org/web/packages/GGIR/vignettes/GGIR.html#510_Circadian_Rhythm_analyses

Note: Many popular websites allow secure access. Please click on the preview button to ensure the web page is accessible.

Web Viewer Terms | Privacy & Cookies Preview

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GGIR config file

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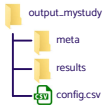
The GGIR pipeline (output folder)



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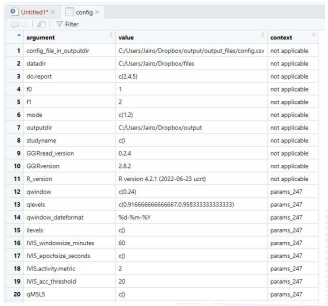
config.csv file

- Modifiable csv file
- Define arguments used
- Can be called in GGIR to process new files



	argument	value	context
1	config_file_in_outputdir	C:/Users/Jairo/Dropbox/output/output_files/config.csv	not applicable
2	datadir	C:/Users/Jairo/Dropbox/files	not applicable
3	do.report	c(2,4,5)	not applicable
4	f0	1	not applicable
5	f1	2	not applicable
6	mode	c(1,2)	not applicable
7	outputdir	C:/Users/Jairo/Dropbox/output	not applicable
8	studyname	c()	not applicable
9	GGIRread_version	0.2.4	not applicable
10	GGIRversion	2.8.2	not applicable
11	R_version	R version 4.2.1 (2022-06-23 ucrt)	not applicable
12	qwindow	c(0,24)	params_247
13	qlevels	c(0.916666666666667,0.958333333333333)	params_247
14	qwindow_dateformat	%d-%m-%Y	params_247
15	ilevels	c()	params_247
16	IVIS_windowsize_minutes	60	params_247
17	IVIS_epochsize_seconds	c()	params_247
18	IVIS.activity.metric	2	params_247
19	IVIS_acc_threshold	20	params_247
20	qM5L5	c()	params_247

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The GGIR()

Processing with config file

```
GGIR(
  # Processing with config file
  datadir = "C:/mystudy/files/",
  outputdir = "C:/mystudy/",
  configfile = "C:/mystudy/output_mystudy/config.csv")
```

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Need help?

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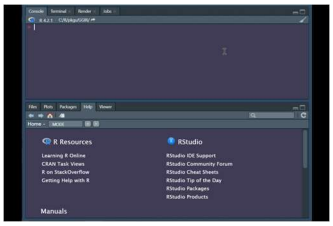
Where and How to find help

1. GGIR function documentation



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Where and How to find help

1. GGIR function documentation
2. GGIR vignettes
   https://CRAN.R-project.org/package=GGIR

Documentation:

Reference manual: GGIR.pdf
Vignettes: Published cut-points and how to use them in GGIR
Embedding external functions in GGIR
Accelerometer data processing with GGIR
GGIR configuration parameters
Day segment analyses with GGIR
Reading csv files with raw data in GGIR

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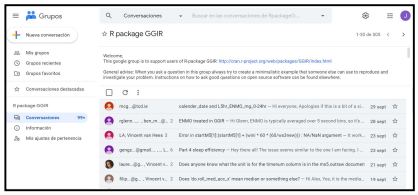
Where and How to find help

1. GGIR function documentation
2. GGIR vignettes
3. Google group

https://groups.google.com/g/RpackageGGIR



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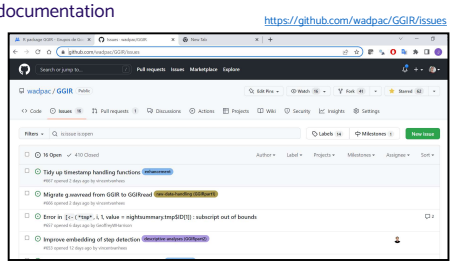
Where and How to find help

1. GGIR function documentation
2. GGIR vignettes
3. Google group
4. Github issues

https://github.com/wadpac/GGIR/issues



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What entails a good question?

Describe the bug

A short, clear and concise description of what the bug is.

To Reproduce

Steps to reproduce the behavior.

1. Sensor brand: '...'
2. Data format: '...'
3. Approximate recording duration '...' days
4. Are you using a sleep diary to guide the sleep detection: YES / NO
5. Copy of R command used: '...'
6. Have you tried processing your data based on GGIR's default argument values? Does the issue you report still appear? YES / NO

Expected behavior

A clear and concise description of what you expected to happen.

Screenshots

If applicable, add screenshots to help explain your problem. Note that usually we are not only interested in see the error message in red, but all GGIR output to the console.

Desktop:

- OS: [e.g. iOS]
- GGIR Version [e.g. 2.2-0]

Additional context

Add any other context about the problem here.

Before submitting

- Have you tried the steps to reproduce? Do they include all relevant data and configuration? Does the issue you report still appear there?
- Have you tried this on the latest 'master' branch from GitHub?

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More information (paper/s)

Journal for the Measurement of Physical Behaviour, 2019, 2, 188-196
https://doi.org/10.1123/jmpb.2018-0063
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Human Kinetics
METHODOLOGY

GGIR: A Research Community–Driven Open Source R Package for Generating Physical Activity and Sleep Outcomes From Multi-Day Raw Accelerometer Data

Jairo H. Migueles — PROFITH Research Group, University of Granada
Alex V. Rowlands — University of Leicester and NIHR Biomedical Research Centre
Florian Huber — Netherlands eScience Center
Séverine Sabia — Inserm, University College London
Vincent T. van Hees — Netherlands eScience Center

Please cite when you use GGIR in your research:
doi: 10.1123/jmpb.2018-0063

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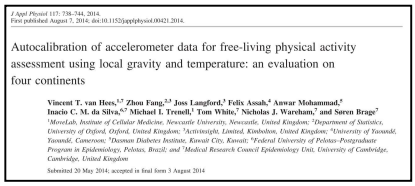
More information (paper/s)



J Appl Physiol 117: 738–744, 2014.
First published August 7, 2014; doi:10.1152/japplphysiol.00421.2014.

Autocalibration of accelerometer data for free-living physical activity assessment using local gravity and temperature: an evaluation on four continents

Vincent T. van Hees,[1,7] Zhou Fang,[2,3] Joss Langford,[3] Felix Assah,[4] Anwar Mohammad,[5] Inacio C. M. da Silva,[6,7] Michael I. Trenell,[3] Tom White,[7] Nicholas J. Wareham,[7] and Søren Brage[7]
[1]*MoveLab, Institute of Cellular Medicine, Newcastle University, Newcastle, United Kingdom;* [2]*Department of Statistics, University of Oxford, Oxford, United Kingdom;* [3]*Activinsight, Limited, Kimbolton, United Kingdom;* [4]*University of Yaoundé, Yaoundé, Cameroon;* [5]*Dasman Diabetes Institute, Kuwait City, Kuwait;* [6]*Federal University of Pelotas–Postgraduate Program in Epidemiology, Pelotas, Brazil; and* [7]*Medical Research Council Epidemiology Unit, University of Cambridge, Cambridge, United Kingdom*

Submitted 20 May 2014; accepted in final form 3 August 2014

Auto-calibration algorithm:
doi: 10.1152/japplphysiol.00421.2014

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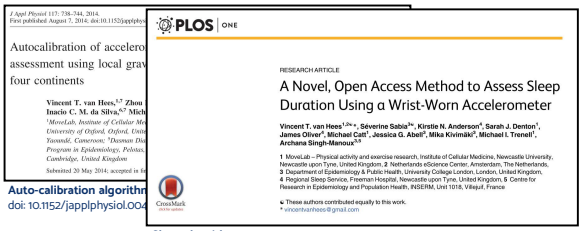
More information (paper/s)



J Appl Physiol 117: 738–744, 2014.
First published August 7, 2014; doi:10.1152/japplphysiol.00421.2014.

Autocalibration of accelero
assessment using local grav
four continents

Vincent T. van Hees,[1,7] Zhou
Inacio C. M. da Silva,[6,7] Mich
[1]*MoveLab, Institute of Cellular Me*
University of Oxford, Oxford, Unit
Yaoundé, Cameroon; [5]*Dasman Dia*
Program in Epidemiology, Pelotas,
Cambridge, United Kingdom

Submitted 20 May 2014; accepted in fi

Auto-calibration algorithm
doi: 10.1152/japplphysiol.004

PLOS ONE

RESEARCH ARTICLE

A Novel, Open Access Method to Assess Sleep Duration Using a Wrist-Worn Accelerometer

Vincent T. van Hees[1,2]*, Séverine Sabia[3,4], Kirstie N. Anderson[5], Sarah J. Denton[1], James Oliver[6], Michael Catt[1], Jessica G. Abell[3], Mika Kivimäki[3], Michael I. Trenell[1], Archana Singh-Manoux[3,4]

1 MoveLab – Physical activity and exercise research, Institute of Cellular Medicine, Newcastle University, Newcastle upon Tyne, United Kingdom, **2** Netherlands eScience Center, Amsterdam, The Netherlands, **3** Department of Epidemiology & Public Health, University College London, London, United Kingdom, **4** Regional Sleep Service, Freeman Hospital, Newcastle upon Tyne, United Kingdom, **5** Centre for Research in Epidemiology and Population Health, INSERM, Unit 1018, Villejuif, France

These authors contributed equally to this work.
* vincentvanhees@gmail.com

Sleep algorithm:
doi: 10.1371/journal.pone.0142533

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How to contribute

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Contribute by…

Doing research on algorithms or evaluating GGIR functionalities

1. Help improve imputation methods for epoch-level data
2. Optimize and evaluate:
   1. HorAngle algorithm for sleep period time definition
   2. Sleep detection in children and preschoolers
   3. Implementation of the Sadeh and the Cole-Kripke sleep algorithms
3. Help develop new functionality

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Contribute by…

Posting/addressing issues in the Github repository
https://github.com/wadpac/GGIR

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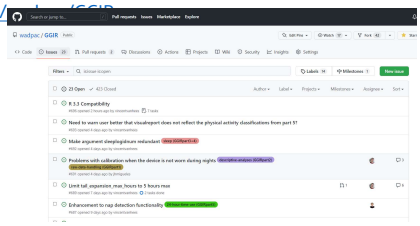
Contribute by…

Posting/addressing issues in the Github repository

https://github.com/



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Assignment 4 (build on assignment 3 script)

1. Run GGIR part 5 using:
   - 1, 2, 5, and 10 min MVPA bouts with a bout criteria of 80%
   - 30 and 60 min inactivity bouts with a bout criteria of 95%
   - 10-min light physical activity bouts with a bout criteria of 80%
   - Waking-up to waking-up time window
2. Look up the output and variables generated

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Day Evaluation

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Thank you!

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