Package ‘metabolic’

July 22, 2025

Title Datasets and Functions for Reproducing Meta-Analyses

Version 0.1.2

Description Dataset and functions from the meta-analysis published in Medicine & Science in Sports & Exercise. It contains all the data and functions to reproduce the analysis. ``Effectiveness of HIIE versus MICT in Improving Cardiometabolic Risk Factors in Health and Disease: A Meta-analysis''. Felipe Mattioni Maturana, Peter Martus, Stephan Zipfel, Andreas M Nieß (2020) <doi:10.1249/MSS.0000000000002506>.

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BugReports `https://github.com/fmmattioni/metabolic/issues`

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`build_gofer` *Build a GOfER diagram (Graphical Overview for Evidence Reviews)*

Description

It is recommended to set `save` = `TRUE` and indicate the `path` to save to, as the plot is not going to look good in the `Plots` panel.

Usage

```
build_gofer(page = c("1", "2"), save = FALSE, path, format = ".png")
```

Arguments

`page`	A text string to indicate the page you would like to display. This GOfER has two pages (28 studies in page 1 and 28 studies in page 2).
`save`	A boolean to indicate whether to save the plot to disk.
`path`	Path to write to. It has to be a character string indicating the path and file name (without the extension). For example, `~/Documents/metabolic_gofer_page_1` will save `metabolic_gofer_page_1`.png to the `Documents` folder.
`format`	The file extension that you want to save the plot to. Only `.`png, is supported.

Value

A `patchwork` object

Examples

```
if (interactive()) {
 build_gofer(page = "1", save = TRUE, path = tempfile())
}
```

`build_report` *Build HTML report*

Description

Build an HTML report with all the results from the chosen clinical endpoint

Usage

```
build_report(
  endpoint = c("VO2max", "Flow-mediated Dilation", "BMI", "Body Mass", "Body Fat",
    "Systolic Blood Pressure", "Diastolic Blood Pressure", "HDL", "LDL", "Triglycerides",
    "Total Cholesterol", "C-reactive Protein", "Fasting Insulin", "Fasting Glucose",
     "HbA1c", "HOMA-IR"),
   path,
   format = ".html"
)
```

Arguments

`endpoint`	The clinical endpoint to build the HTML report.
`path`	Path to write to. It has to be a character string indicating the path and file name (without the extension). For example, `~/Documents/metabolic_report` will save `metabolic_report.html` to the `Documents` folder.
`format`	The file extension that you want to build the report with. Only `.html`, is supported.

Value

an HTML file.

Examples

```
if(interactive()) {
# Build an HTML report on VO2max
build_report(endpoint = "VO2max", path = tempfile())
}
```

`metabolic_gofer` *Dataset for building a GOfER diagram (Graphical Overview for Evidence Reviews)*

Description

A dataset containing the summary of the studies included in the meta-analysis. This dataset is used to build a GOfER with 'ggplot2' and 'patchwork'.

Usage

```
metabolic_gofer
```

Format

A data frame with 115 rows and 33 variables:

study last name of first author and year of publication

groups group allocated in the study, it may be either: HIIT (High-intensity Interval Training), SIT (Sprint Interval Training), or MICT (Moderate-intensity Continuous Training)

sample_population population category from the study, it may be either: Healthy, Overweight/obese, Cardiac Rehabilitation, Metabolic Syndrome, or T2D (Type-2 Diabetes)

sample_fitness the general fitness condition of the sample reported in the study, it may be either: Active, Sedentary, or N/R (Not Reported)

sample_men_ratio the men ratio (total men divided by sample size) reported in the study

anamnese_smoker information whether participants in the sample were smokers, it may either: Y (Yes), N (No), or N/R (Not Reported)

anamnese_medicines_to_control_BP information whether participants in the sample were taking regular medication to control blood pressure, it may either: Y (Yes), N (No), or N/R (Not Reported)

age the age of each group reported in the study, in years

design_type_of_exercise the type of exercise used for exercise training, it may be either running or cycling

design_sample_size the sample size of each group in the study

design_training_duration the training duration, in weeks

design_training_frequency the training frequency for each group used in the study

design_exercise_intensity the prescribed exercise intensity for each group

hiie_n_reps number of repetitions prescribed for the HIIE (High-intensity Interval Exercise) protocol

hiie_rep_duration length of repetitions prescribed for the HIIE (High-intensity Interval Exercise) protocol

hiie_work_rest_ratio the work-rest ratio in the HIIE (High-intensity Interval Exercise) protocol

compliance compliance reported in each group and study

endpoints_vo2max information on whether the reported p-value was singificant comparing the effects pre- and post-training on VO2max (maximal oxygen uptake). If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

endpoints_fmd information on whether the reported p-value was singificant comparing the effects pre- and post-training on Flow-mediated Dilation. If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

endpoints_body_mass information on whether the reported p-value was singificant comparing the effects pre- and post-training on Body Mass. If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

endpoints_body_fat information on whether the reported p-value was singificant comparing the effects pre- and post-training on Body Fat. If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

endpoints_sbp information on whether the reported p-value was singificant comparing the effects pre- and post-training on Systolic Blood Pressure. If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

endpoints_dbp information on whether the reported p-value was singificant comparing the effects pre- and post-training on Diastolic Blood Pressure. If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

endpoints_hdl information on whether the reported p-value was singificant comparing the effects pre- and post-training on HDL. If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

endpoints_ldl information on whether the reported p-value was singificant comparing the effects pre- and post-training on LDL. If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

endpoints_triglycerides information on whether the reported p-value was singificant comparing the effects pre- and post-training on Triglycerides. If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

endpoints_total_cholesterol information on whether the reported p-value was singificant comparing the effects pre- and post-training on Total Cholesterol. If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

endpoints_insulin information on whether the reported p-value was singificant comparing the effects pre- and post-training on Fasting Insulin. If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

endpoints_glucose information on whether the reported p-value was singificant comparing the effects pre- and post-training on Fasting Glucose. If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

endpoints_homa information on whether the reported p-value was singificant comparing the effects pre- and post-training on HOMA-IR (insulin resistance). If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

endpoints_bmi information on whether the reported p-value was singificant comparing the effects pre- and post-training on BMI (body mass index). If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

endpoints_crp information on whether the reported p-value was singificant comparing the effects pre- and post-training on C-reactive Protein. If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

endpoints_hba1c information on whether the reported p-value was singificant comparing the effects pre- and post-training on HbA1c (glycated hemoglobin). If Yes, the reported p-value was less than 0.05; if No, the reported p-value was greater than 0.05

Source

`https://journals.lww.com/acsm-msse/Fulltext/2021/03000/Effectiveness_of_HIIE_versus_MICT_in_Improving.12.aspx`

`metabolic_meta` *Dataset for reproducing the meta-analysis*

Description

A dataset containing the processed data from the studies necessary to reproduce the meta-analysis.

Usage

`metabolic_meta`

Format

A data frame with 391 rows and 21 variables:

study last name of first author and year of publication

endpoint the clinical endpoint analyzed, it may be either: VO2max (maximal oxygen uptake), Flow-mediated Dilation, BMI (body mass index), Body Mass, Body Fat, Systolic Blood Pressure, Diastolic Blood Pressure, HDL, LDL, Triglycerides, Total Cholesterol, C-reactive Protein, Fasting Insulin, Fasting Glucose, HbA1c (glycated hemoglobin), or HOMA-IR (insulin resistance)

population population category from the study, it may be either: Healthy, Overweight/obese, Cardiac Rehabilitation, Metabolic Syndrome, or T2D

age the median age between the groups in the study, in years

category_age age category based on the age column, it may be either: < 30 y, 30 - 50 y, or > 50 y

duration the training duration, in weeks

category_duration training duration category based on the duration column, it may be either: < 5 weeks, 5 - 10 weeks, or > 10 weeks

men_ratio the men ratio (total men divided by sample size) reported in the study

category_men_ratio men ratio category based on the men_ratio column, it may be either: < 0.5 or > 0.5

type_exercise the type of exercise used for exercise training, it may be either running or cycling

bsln the baseline value reported for the clinical endpoint (the median between groups is used)

bsln_adjusted the adjusted baseline value for the clinical endpoint. Values were adjusted according to their categories described in the paper. For example, VO2max values were adjusted to their age and sex percentile ranks, etc. From these values, the categories are defined in 'category_bsln'

category_bsln the baseline category based on the bsln column

N_HIIE sample size of the HIIE (High-intensity Interval Exercise) group

Mean_HIIE mean difference between pre- and post-training in the HIIE (High-intensity Interval Exercise) group

SD_HIIE standard deviation of the difference between pre- and post-training in the HIIE (High-intensity Interval Exercise) group

N_MICT sample size of the MICT (Moderate-intensity Continuous Training) group

Mean_MICT mean difference between pre- and post-training in the MICT (Moderate-intensity Continuous Training) group

SD_MICT standard deviation of the difference between pre- and post-training in the MICT (Moderate-intensity Continuous Training) group

HIIE the type of HIIE used in the study: it may be either: HIIT (High-intensity Interval Training) or SIT (Sprint Interval Training)

desired_effect the desired effect expected for post-training improvements. This is needed simply to display the effects related to HIIE and MICT on the same side of the forest plot throughout the clinical endpoints

Source

`https://journals.lww.com/acsm-msse/Fulltext/2021/03000/Effectiveness_of_HIIE_versus_MICT_in_Improving.12.aspx`

`perform_bind` *Combine the subgroup meta-analyses*

Description

Combine the subgroup meta-analyses to ...

Usage

```
perform_bind(x)
```

Arguments

`x`	An object retrieved from perform_meta.

Value

a tibble with named lists.

Examples

```
if (interactive()) {
# Perform meta-analysis on VO2max
results <- perform_meta(endpoint = "VO2max")
results

# Combine Overall and Subgroups meta-analysis results
results_bind <- perform_bind(results$meta_analysis)
results_bind
}
```

`perform_meta` *Perform meta-analysis*

Description

Perform the meta-analysis, sensitivity analysis, and meta-regression on the chosen clinical endpoint.

Usage

```
perform_meta(
  endpoint = c("VO2max", "Flow-mediated Dilation", "BMI", "Body Mass", "Body Fat",
    "Systolic Blood Pressure", "Diastolic Blood Pressure", "HDL", "LDL", "Triglycerides",
    "Total Cholesterol", "C-reactive Protein", "Fasting Insulin", "Fasting Glucose",
      "HbA1c", "HOMA-IR")
)
```

Arguments

`endpoint`	The clinical endpoint to perform the meta-analysis and meta-regression.

Value

a tibble with named lists.

Examples

```
if (interactive()) {
# Perform meta-analysis on VO2max
results <- perform_meta(endpoint = "VO2max")
results

# Access results of Overall meta-analysis
results$meta_analysis$Overall

# Acess results of Age meta-regression
results$meta_regression$Age
}
```

`plot_metabolic` *Plot results*

Description

Plot results from the `perform_meta()` and `perform_bind()` function. Please, see 'Details' and 'Examples'.

Usage

```
plot_metabolic(x, save = FALSE, path, format = ".png")
```

Arguments

`x`	an object obtained from the meta-analysis results. See 'Details'.
`save`	A boolean to indicate whether to save the plot to disk.
`path`	Path to write to. It has to be a character string indicating the path and file name (without the extension). For example, `~/Documents/metabolic_gofer_page_1` will save `metabolic_gofer_page_1.png` to the `Documents` folder.
`format`	The file extension that you want to save the plot to. Only `.png`, is supported.

Details

This function can be used to plot the results derived from both `perform_meta()` and `perform_bind()`. It can produce forests and bubble plots, depending on the object passed to the function.

Value

a plot.

Examples

```
if(interactive()) {
# Perform meta-analysis on VO2max
results <- perform_meta(endpoint = "VO2max")

# Plot Overall meta-analysis results
results$meta_analysis$Overall %>%
   plot_metabolic()

# Plot Age meta-regression results
results$meta_regression$Age %>%
   plot_metabolic()

# Plot overview of Overall and Subgroups meta-analysis results
results_bind <- perform_bind(results$meta_analysis)
results_bind %>%
   plot_metabolic()
```

```
# Plot sensitivity analysis results
results$sensitivity_analysis$Overall %>%
   plot_metabolic()
}
```

`plot_small_study_effects`

Plot small-study effects analysis

Description

Plot small-study effects analysis

Usage

```
plot_small_study_effects(x, save = FALSE, path, format = ".png")
```

Arguments

`x`	an object of class meta
`save`	A boolean to indicate whether to save the plot to disk.
`path`	Path to write to. It has to be a character string indicating the path and file name (without the extension). For example, `~/Documents/small_study_effects` will save `small_study_effects.png` to the `Documents` folder.
`format`	The file extension that you want to save the plot to. Only `.png`, is supported.

Value

a plot.

Examples

```
## Not run:
  # Perform meta-analysis on VO2max
  results <- perform_meta(endpoint = "VO2max")

  # Plot small-study effects results
  results$meta_analysis$Overall %>%
     plot_small_study_effects()

## End(Not run)
```

`read_paper` *Read the paper*

Description

This function will open the published paper in the journal website for you to read it in your default browser.

Usage

```
read_paper()
```

Examples

```
read_paper()
```

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