

Package: enhancedTtest (via r-universe)

October 28, 2026

Title Enhanced T-Test with Automatic Selection and APA Formatting

Version 0.1.0

Description Provides enhanced t-test functionality with automatic assumption checking, non-parametric fallbacks, effect size calculation, and APA-formatted tables that can be exported to Word documents. Supports one-sample, two-sample, and paired t-tests with intelligent test selection. Effect size interpretations follow Cohen (1988) <doi:10.4324/9780203771587> and APA formatting follows the Publication Manual of the American Psychological Association, 7th edition (2020) <doi:10.1037/0000165-000>.

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Encoding UTF-8

Depends R (>= 3.5.0)

Imports car (>= 3.0-0), dplyr (>= 1.0.0), flextable (>= 0.7.0),
htmltools (>= 0.5.0), nortest (>= 1.0-4), officer (>= 0.4.0),
rlang (>= 1.0.0), stats, utils

Suggests ggplot2, knitr, rmarkdown, testthat (>= 3.0.0)

VignetteBuilder knitr

Config/testthat/edition 3

Config/roxygen2/version 8.1.0

NeedsCompilation no

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Config/pak/sysreqs

libcairo2-dev cmake libfontconfig1-dev libfreetype6-dev libfribidi-dev make libharfbuzz-dev libicu-dev libjpeg-dev libpng-dev libtiff-dev libuv1-dev libwebp-dev libxml2-dev libssl-dev

Repository https://analystnyamu.r-universe.dev

Date/Publication 2026-10-27 15:20:07 UTC

RemoteUrl https://github.com/cran/enhancedTtest

RemoteRef HEAD

RemoteSha fe830c6ec954243de782285a73d0dbbf71dd168a

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calculate_effect_size	<i>Calculate Effect Size for Any Test</i>
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Description

Calculate Effect Size for Any Test

Usage

calculate_effect_size(result)

Arguments

result Test result object

Value

Effect size with interpretation

`check_complete_assumptions`*Complete Assumption Checking for All Test Types*

Description

Complete Assumption Checking for All Test Types

Usage

```
check_complete_assumptions(data, response_var, group_var, test_type)
```

Arguments

<code>data</code>	Data frame
<code>response_var</code>	Name of response variable
<code>group_var</code>	Name of grouping variable (NULL for one-sample)
<code>test_type</code>	Character, "one_sample", "two_sample", or "paired"

Value

List with assumption check results

`check_homogeneity`*Check Homogeneity of Variance*

Description

Check Homogeneity of Variance

Usage

```
check_homogeneity(  
  data,  
  response_var,  
  group_var,  
  method = "levene",  
  alpha = 0.05  
)
```

Arguments

data	Data frame
response_var	Name of response variable
group_var	Name of grouping variable
method	Character, "levene" or "bartlett"
alpha	Significance level

Value

List with variance homogeneity results

check_normality	<i>Check Normality with Multiple Methods</i>
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Description

Check Normality with Multiple Methods

Usage

```
check_normality(x, method = "shapiro", alpha = 0.05)
```

Arguments

x	Numeric vector
method	Character, "shapiro", "anderson", or "both"
alpha	Significance level

Value

List with normality check results

Description

Performs one-sample, two-sample, or paired t-tests with automatic non-parametric fallbacks when assumptions are violated. Handles input validation, assumption checking, effect size calculation, and produces APA-formatted output.

Usage

```
complete_ttest(
  data,
  formula,
  paired = FALSE,
  alternative = "two.sided",
  mu = 0,
  auto_select = TRUE,
  apa_table = TRUE,
  export_word = FALSE,
  filename = "ttest_results.docx"
)
```

Arguments

data	A data frame containing the variables.
formula	A formula specifying the model: - One-sample: response ~ 1 - Two-sample: response ~ group - Paired: response ~ group with paired = TRUE
paired	Logical, whether to perform a paired t-test (default FALSE).
alternative	Character string specifying the alternative hypothesis. Must be one of "two.sided" (default), "less", or "greater".
mu	Numeric, the hypothesized mean for one-sample tests (default 0). Ignored for two-sample and paired tests.
auto_select	Logical, if TRUE (default) automatically selects a parametric or non-parametric test based on assumption checks (normality and homogeneity of variance). If FALSE, always performs the parametric test.
apa_table	Logical, if TRUE (default) creates an APA-formatted flextable object.
export_word	Logical, if TRUE exports the APA table to a Word document (default FALSE).
filename	Character string, output filename for Word export. Only used when export_word = TRUE.

Value

An object of class `complete_ttest` (also inheriting from `enhanced_ttest`), which is a named list containing the following components:

`raw` The raw test result object returned by `t.test` or `wilcox.test`. Contains the test statistic, degrees of freedom, p-value, confidence interval, and estimates.

`method` Character string naming the test performed (e.g., "Welch's t-test", "Mann-Whitney U test").

`parametric` Logical; TRUE if a parametric test was used, FALSE if a non-parametric alternative was selected.

`test_type` Character string indicating the test type: "one_sample", "two_sample", or "paired".

`response_var` Character string with the name of the response variable from the formula.

`group_var` Character string with the name of the grouping variable from the formula, or NULL for one-sample tests.

`data` The processed data frame used in the analysis, after removing missing values and converting the grouping variable to a factor (if applicable).

`alternative` Character string with the alternative hypothesis used.

`mu` Numeric value of the hypothesized mean (for one-sample tests).

`descriptive_stats` Data frame with descriptive statistics by group (or overall for one-sample tests). Contains columns: group, N, Mean, SD, SE for parametric tests; or group, N, Median, IQR for non-parametric tests.

`effect_size` A named list describing the effect size with elements:

- `value`: Numeric effect size value.
- `name`: Character string, either "Cohen's d" (parametric) or "r" (non-parametric).
- `interpretation`: Character string describing the magnitude (e.g., "Small", "Medium", "Large").

`assumptions` A named list with results of assumption checks, including `normality_passed`, `normality_p_value`, `variance_passed`, `variance_p_value`, plus warnings and recommendations character vectors.

`apa_table` A flextable object containing the publication-ready APA-formatted table, or NULL if `apa_table = FALSE` or table creation failed.

`recommendation` Character string with a plain-language summary of the analysis, including the test method used, assumption check results, significance, and effect size interpretation.

`call` The matched function call, for reproducibility.

The object has S3 methods `print.complete_ttest` and `summary.complete_ttest` for displaying results.

See Also

`create_complete_apa_table` for building APA tables, `export_apa_to_word` for Word export, `format_p_value` for formatting p-values.

Examples

```
# One-sample t-test: test if mean mpg differs from 20
result <- complete_ttest(mtcars, mpg ~ 1, mu = 20)
print(result)

# Two-sample t-test: compare Sepal.Length between two species
iris_subset <- iris[iris$Species != "virginica", ]
iris_subset$Species <- droplevels(iris_subset$Species)
result <- complete_ttest(iris_subset, Sepal.Length ~ Species)
summary(result)

# Access components
result$method          # Test name
result$raw$p.value     # p-value
result$effect_size     # Effect size with interpretation
result$apa_table       # APA-formatted flextable
```

create_apa_table	Create APA Table (Alias)
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Description

Alias for [create_complete_apa_table](#).

Usage

```
create_apa_table(result)
```

Arguments

result	A complete_ttest result object
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Value

A flextable object

`create_complete_apa_table`*Create APA Table for complete_ttest Object*

Description

Creates a publication-ready APA-formatted table from a `complete_ttest` result object. Automatically selects the correct table format based on the test type (one-sample, two-sample, or paired) and whether the test was parametric or non-parametric.

Usage

```
create_complete_apa_table(result)
```

Arguments

`result` A `complete_ttest` result object

Value

A flextable object, or NULL if descriptive statistics are not available

Examples

```
result <- complete_ttest(  
  iris[iris$Species != "virginica", ],  
  Sepal.Length ~ Species  
)  
create_complete_apa_table(result)
```

`create_complete_report`*Create Complete Report in Word*

Description

Generates a comprehensive Word document containing descriptive statistics, inferential tests, and interpretations for multiple outcome variables.

Usage

```
create_complete_report(  
  data,  
  formula_list,  
  group_var,  
  paired = FALSE,  
  title = "Statistical Analysis Report",  
  filename = "apa_report.docx",  
  include_descriptives = TRUE,  
  include_interpretations = TRUE  
)
```

Arguments

data	A data frame containing the variables
formula_list	A list of formulas (e.g., list(y1 ~ group, y2 ~ group))
group_var	Character, name of the grouping variable
paired	Logical, whether to perform paired tests
title	Character, report title
filename	Character, output filename (should end in .docx)
include_descriptives	Logical, include descriptive statistics table
include_interpretations	Logical, include APA interpretations

Value

Invisibly returns the path to the created file

Examples

```
formulas <- list(  
  Sepal.Length ~ Species,  
  Sepal.Width ~ Species  
)  
tmp <- tempfile(fileext = ".docx")  
data_subset <- iris[iris$Species != "virginica", ]  
data_subset$Species <- droplevels(data_subset$Species)  
create_complete_report(  
  data = data_subset,  
  formula_list = formulas,  
  group_var = "Species",  
  filename = tmp  
)
```

export_apa_to_html	<i>Export APA Table to HTML</i>
--------------------	---------------------------------

Description

Exports an APA-formatted flextable to an HTML file.

Usage

```
export_apa_to_html(
  ft,
  filename = "ttest_results.html",
  include_interpretation = TRUE,
  interpretation_text = NULL
)
```

Arguments

ft	A flextable object containing the APA-formatted table
filename	Character, output filename (should end in .html)
include_interpretation	Logical, include interpretation section
interpretation_text	Character, interpretation text to include

Value

Invisibly returns the path to the created file

Examples

```
result <- complete_ttest(
  iris[iris$Species != "virginica", ],
  Sepal.Length ~ Species
)
tmp <- tempfile(fileext = ".html")
export_apa_to_html(result$apa_table, tmp)
```

export_apa_to_word	<i>Export APA Table to Word</i>
--------------------	---------------------------------

Description

Exports an APA-formatted flextable to a Word document with proper formatting. Attempts to use `flextable::save_as_docx()` first, with a fallback to `officer` for older flextable versions.

Usage

```
export_apa_to_word(
  apa_table,
  filename = "ttest_results.docx",
  title = "T-Test Results"
)
```

Arguments

apa_table	A flextable object containing the APA-formatted table
filename	Character, output filename (should end in .docx)
title	Character, optional title for the document

Value

Invisibly returns the path to the created file

Examples

```
result <- complete_ttest(
  iris[iris$Species != "virginica", ],
  Sepal.Length ~ Species
)
tmp <- tempfile(fileext = ".docx")
export_apa_to_word(result$apa_table, tmp)
```

format_p_value	<i>Format p-value for APA style</i>
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Description

Format p-value for APA style

Usage

```
format_p_value(p, include_stars = TRUE)
```

Arguments

p Numeric p-value
 include_stars Logical, include significance stars (default TRUE)

Value

Character string with formatted p-value

Examples

```
format_p_value(0.0001)
format_p_value(0.03)
format_p_value(0.5)
```

generate_test_data	<i>Generate random test data</i>
--------------------	----------------------------------

Description

Generate random test data

Usage

```
generate_test_data(
  n = 50,
  mean = 10,
  sd = 2,
  group1_name = "A",
  group2_name = "B",
  seed = 123
)
```

Arguments

n Sample size per group (default 50)
 mean Mean of first group (default 10)
 sd Standard deviation (default 2)
 group1_name Name of first group (default "A")
 group2_name Name of second group (default "B")
 seed Random seed (default 123)

Value

A data frame with columns value and group

Examples

```
df <- generate_test_data()
```

interpret_cohens_d	<i>Interpret Cohen's d</i>
--------------------	----------------------------

Description

Interpret Cohen's d

Usage

```
interpret_cohens_d(d)
```

Arguments

d	Numeric Cohen's d value
---	-------------------------

Value

Character string with interpretation

Examples

```
interpret_cohens_d(0.3)
```

interpret_r	<i>Interpret r (for non-parametric tests)</i>
-------------	---

Description

Interpret r (for non-parametric tests)

Usage

```
interpret_r(r)
```

Arguments

r	Numeric r value
---	-----------------

Value

Character string with interpretation

Examples

```
interpret_r(0.4)
```

print.complete_ttest *Print method for complete_ttest objects*

Description

Formats and prints a `complete_ttest` object to the console in a human-readable format. The output includes the test type, method used, assumption check results, descriptive statistics, test statistics, effect size, and (if present) the APA-formatted table.

Usage

```
## S3 method for class 'complete_ttest'
print(x, ...)
```

Arguments

`x` A `complete_ttest` object returned by [complete_ttest](#).
`...` Additional arguments passed to `print`. Currently ignored.

Value

Invisibly returns the input object `x`, unchanged. This function is called primarily for its side effect of printing a formatted summary of the t-test analysis to the console.

The printed output includes:

- **Test information:** test type ("one_sample", "two_sample", or "paired"), test method name, whether a parametric or non-parametric test was used, and the variable names.
- **Assumption checks:** results of normality and homogeneity of variance tests, plus any recommendations (only shown if assumption checks were performed).
- **Descriptive statistics:** sample size, mean, standard deviation, and standard error by group (or overall for one-sample tests). For non-parametric tests, median and interquartile range are shown instead.
- **Test results:** test statistic, degrees of freedom, p-value, and 95\
- **Effect size:** the effect size value, name (Cohen's *d* or *r*), and magnitude interpretation (e.g., "Small", "Medium", "Large").
- **APA-formatted table:** if `x$apa_table` is not NULL, the publication-ready table is printed inline.
- **Summary:** a plain-language summary combining the method used, assumption results, significance, and effect size.

See Also

[summary.complete_ttest](#) for a condensed summary with an APA-style interpretation, [complete_ttest](#) for the main analysis function.

Examples

```
result <- complete_ttest(mtcars, mpg ~ 1, mu = 20)
print(result)
```

summary.complete_ttest

Summary method for complete_ttest objects

Description

Provides a condensed summary of a complete_ttest object, including all the information shown by [print.complete_ttest](#) plus a plain-language, APA-style interpretation of the results.

Usage

```
## S3 method for class 'complete_ttest'
summary(object, ...)
```

Arguments

object	A complete_ttest object returned by complete_ttest .
...	Additional arguments passed to summary. Currently ignored.

Value

Invisibly returns the input object object, unchanged. This function is called primarily for its side effect of printing a detailed summary of the t-test analysis to the console.

The printed output includes everything from [print.complete_ttest](#) plus:

- **APA-style interpretation:** a complete sentence describing the test performed, the variables compared, the statistical result (with test statistic, degrees of freedom, and p-value), and the effect size with its interpretation. This text is suitable for direct inclusion in a research report or manuscript.

See Also

[print.complete_ttest](#), [complete_ttest](#).

Examples

```
result <- complete_ttest(mtcars, mpg ~ 1, mu = 20)
summary(result)
```

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