Package 'swdpwr'

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Type Package

Title Power Calculation for Stepped Wedge Cluster Randomized Trials

Version 1.1

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Description To meet the needs of statistical power calculation for stepped wedge cluster randomized trials, we developed this software. Different parameters can be specified by users for different scenarios, including: cohort and cross-sectional settings, binary and continuous outcomes, marginal (GEE) and conditional (mixed effect model) methods, different link functions (identity, log, logit links), with and without time effect of treatment, etc. The methods included in this package: Zhou et al. (2018) <doi:10.1093/biostatistics/kxy031>, Li et al. (2018b) <doi:10.1111/biom.12918>.

License GPL-3

Encoding UTF-8

LazyData TRUE

NeedsCompilation yes

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swdpwr-package *Power Calculation for Stepped Wedge Cluster Randomized Trials*

Description

This package includes a function swdpower that accounts for power calculation for stepped wedge cluster randomized trials.

Details

Package:	swdpwr
Type:	Package
Version:	1.1
Date:	2020-03-09
License:	GPL (version 3)

Previous literature and developement of software focused mainly on continuous outcomes and obtained approximation results for binary outcomes. This package implemented new methods of power calculation for stepped wedge designs with binary outcomes and also incorporated procedures for continuous outcomes. The function swdpower can accommodate both cross-sectional and cohort settings by specifying three levels of correlation parameters, and includes scenarios under both conditional method (mixed effect model) and marginal method (GEE), different link functions (identity, log, logit links), with or without time effect, etc. With this package, investigators can obtain more accurate calculation of statistical power, that will help a lot in the design and analysis of stepped wedge cluster randomized trials.

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References

Zhou X, Liao X, Kunz L M, et al. A maximum likelihood approach to power calculations for stepped wedge designs of binary outcomes[J]. Biostatistics, 2020, 21(1): 102-121.

Li F, Turner E L, Preisser J S. Sample size determination for GEE analyses of stepped wedge cluster randomized trials[J]. Biometrics, 2018, 74(4): 1450-1458.

swdpower *A wrap of power calculation for Stepped Wedge Design Studies.*

Description

This function performs power calculations for stepped wedge cluster randomized trials under different scenarios.

Usage

```
swdpower(
  I,
  J,
  K,
  dataset,
  response = 2,
  model = 2,
  link = 1,
  mu,
  beta,
  gammaJ = 0,
  sigma2 = 0,
  alpha = 0.05,
  ICC0 = 0.1,
  ICC1 = ICC0/2,
  ICC2
)
```

Arguments

I	number of clusters
J	number of time periods
K	number of participants at each time step from every cluster
dataset	data set that describes the study design (control 0, intervention 1)
response	choose continuous outcome(response=1) or binary outcome(response=2), with default value of 2
model	choose conditional model (model=1) or marginal model(model=2), with default value of 2
link	choose link function (identity 1, log 2, logit 3), with default value of 1
mu	baseline effect in control groups
beta	treatment effect (the parameter we would like to test)
gammaJ	time effect at time period J, with default value of 0
sigma2	marginal variance of the outcome (only needed for continuous outcomes)
alpha	two-sided type I error, with default value of 0.05
ICC0	within-period correlation
ICC1	inter-period correlation
ICC2	within-individual correlation

Value

The object returned is a list, which includes the design matrix and a summary table of this design (including the power).

Examples

```
library(swdpwr)
#designs for binary outcomes: parameter sigma2 is not required.
dataset = matrix(c(rep(c(0,1,1),6),rep(c(0,0,1),6)),12,3,byrow=TRUE)
swdpower(I = 12, J = 3, K = 50, dataset, response = 2, model = 2, link = 3,
mu = -0.9, beta= 0.5, gammaJ= 0.2, alpha = 0.05, ICC0 = 0.01, ICC1 = 0.01, ICC2 = 0.01)
#designs for continuous outcomes: parameter sigma2 is required.
dataset = matrix(c(rep(c(0,1,1),4),rep(c(0,0,1),4)),8,3, byrow=TRUE)
swdpower(I = 8, J = 3, K = 24, dataset, response = 1, model = 2, link = 1,
mu = 0.1, beta = 0.2, gammaJ = 0.1, sigma2 = 0.095, alpha = 0.05, ICC0 = 0.03,
ICC1 = 0.015, ICC2 = 0.2)
```

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