

Inputs for Power Analysis: Internal Pilot

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Learning Objectives

Define internal pilot studies.

Understand the benefits of internal pilot studies.

Understand the limitations of internal pilot studies.

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An internal pilot design can be a strategy for identifying inputs for power and sample size analysis

An **internal pilot** estimates parameters using data from a portion of the main study.

Coffey and Muller, 1999, 2000, 2003
Coffey et al., 2007
Gurka et al., 2007

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Internal pilots are conducted in five sequential steps

1. Specify study characteristics
design dimensions
mean differences of a priori interest
planning value standard deviation
recruiting time
2. Collect half of the data (typically)

Coffey and Muller, 1999, 2000, 2003
Coffey et al., 2007
Gurka et al., 2007

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Internal pilots are conducted in five sequential steps

3. Re-estimate variance based on pilot
4. Re-calculate sample size
5. Collect remaining data and conduct test based on all the data.

Coffey and Muller, 1999, 2000, 2003
Coffey et al., 2007
Gurka et al., 2007

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Internal pilots are useful for interim power analyses

Using a portion of the main study's data enables better estimation of inputs for power and sample size calculation.

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Unfortunately, internal pilots have limited applications

Internal pilots are usually not intended for:
Estimating means or confidence intervals
Interim data analysis

See Kairalla et al., 2010 for ways to combine internal pilots and interim data analysis.

Kairalla et al., 2010

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Internal pilots can also inflate the Type I error rate

Recall, Type I error is the probability of incorrectly rejecting the null hypothesis.

Type I error inflation occurs in small studies when the variance is estimated.

For large studies (>~50 participants), no Type I error rate inflation occurs.

Coffey and Muller, 1999, 2000, 2003

Coffey et al., 2007

Gurka et al., 2007

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REVIEW OF LEARNING OBJECTIVES

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An internal pilot aids in power and sample size analysis in which of the following ways?

Improve estimation of variance

Validate parameters by using another researcher's data

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Internal pilot studies can be used for which of the following?

Estimation of variance for power and sample size calculation

Interim data analysis

Estimation of means and confidence intervals

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Questions?

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