ENGAGE data independence testing

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Comparing categorical independence

For more info on this topic see:

Kim HY. Statistical notes for clinical researchers: Chi-squared test and Fisher's exact test. Restor Dent Endod. 2017 May;42(2):152-155. doi: 10.5395/rde.2017.42.2.152. Epub 2017 Mar 30. PMID: 28503482; PMCID: PMC5426219.

Solution vs. Stakeholder Engagement

Chi Square and Fishers Exact Test on contingency table with Solution/No Solution as the explanatory, and engaged stakeholder/did not engage stakeholder as the response.

Both chi square and fishers exact test were insignificant/borderline, with a chi square approximation of ~44, which is well above the critical value (3.84 for one degree of freedom). Fishers exact test returned an odds ratio of ~18. The alternative hypothesis: true odds ratio is not equal to 1. Null is rejected.

The FET defaults to associating the odds ratio (which can represent effect size) with the first cell. In this instance "The odds of having a solution is 18.25 times that for an engaged stakeholder". You could flip the response and explanatory, but the odds ratio would stay the same.

```
##          stakeholder
## solution  E  NE
##       S  14   4
##       NS 76 400

## Number of cases in table: 494
## Number of factors: 2
## Test for independence of all factors:
##   Chisq = 44.48, df = 1, p-value = 2.576e-11
##   Chi-squared approximation may be incorrect

##
##  Fisher's Exact Test for Count Data
##
## data:  solution_stakeholder
## p-value = 2.968e-08
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##    5.538514 78.189983
## sample estimates:
## odds ratio
##    18.25981
```

Solution vs. Model

Chi Square and Fishers Exact Test on contingency table with Solution/No Solution as the explanatory, and Model/No Model as the response.

Both chi square and fishers exact test were insignificant/borderline, with a chi square approximation of ~3.7, which is below to the critical value (3.84 for one degree of freedom). Fishers exact test returned an odds ratio of under 1. Null is accepted.

The FET defaults to associating the odds ratio (which can represent effect size) with the first cell. In this instance "The odds of having a solution is .39 times that for having a model". You could flip the response and explanatory, but the odds ratio would stay the same.

```
##          model
## solution   M NM
##       S   11  7
##       NS 377 94


## Number of cases in table: 489
## Number of factors: 2
## Test for independence of all factors:
##   Chisq = 3.792, df = 1, p-value = 0.05151
##   Chi-squared approximation may be incorrect


##
##   Fisher's Exact Test for Count Data
##
## data:  solution_model
## p-value = 0.07051
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##   0.134767 1.228801
## sample estimates:
## odds ratio
##   0.3927391
```

Solution vs. Engagement (reversed cells)

```
##           stakeholder
## solution  E   NE
##       NS 76 400
##        S 14    4


## Number of cases in table: 494
## Number of factors: 2
## Test for independence of all factors:
##   Chisq = 44.48, df = 1, p-value = 2.576e-11
##   Chi-squared approximation may be incorrect


##
##   Fisher's Exact Test for Count Data
##
## data:  nosolution_stakeholder
## p-value = 2.968e-08
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##   0.01278936 0.18055386
## sample estimates:
## odds ratio
## 0.05476509
```

Solution vs. Model (reversed cells)

```
##       solution
## model   M NM
##    NS 377 94
##    S    11  7
```

```
## Number of cases in table: 489
## Number of factors: 2
## Test for independence of all factors:
##  Chisq = 3.792, df = 1, p-value = 0.05151
##  Chi-squared approximation may be incorrect
```

```
##
##  Fisher's Exact Test for Count Data
##
## data:  nomodel_solution
## p-value = 0.07051
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##  0.8138014 7.4202155
## sample estimates:
## odds ratio
##   2.546219
```