

# Conference Materials 2017

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## Project Description

This project was implemented to further develop methods that were originated previously (*insert DOI for 2016 abstract*) as part of a larger project (F32DK107157) to study common biases and statistical mistakes made in nutrition and obesity research. One such bias is p-hacking. As the poster describes in more detail, this project replicated a previously implemented rapid and high-volume method for detecting p-hacking in scientific literature. This work has since been further developed and presented on, and a manuscript with fully-developed methods is now being prepared for publication.

## Conference Description

This work was presented at the 5th Workshop on Biostatistics and Bioinformatics in Atlanta, Georgia, USA, in 2017.

## Contact Information for Investigators

### Principal Investigator

- Cynthia M. Kroeger, PhD, Postdoctoral Fellow, Indiana University School of Public Health-Bloomington, Department of Epidemiology and Biostatistics, kroeger@iu.edu

### Co-investigators

- Andrew W. Brown, PhD, Assistant Professor, Indiana University School of Public Health-Bloomington, Department of Applied Health Sciences, awb1@iu.edu
- David B. Allison, PhD, Dean, Distinguished Professor, Provost Professor, Indiana University School of Public Health-Bloomington, Department of Epidemiology and Biostatistics, allison@iu.edu

At the time of presentation, Dr. Kroeger was a Postdoctoral Fellow at the University of Alabama at Birmingham, and Drs. Brown and Allison were affiliated with the University of Alabama at Birmingham.

## Description of Supporting Materials

### Presentation: Poster

This work was presented as a poster.

**File name for poster:** conference\_materials\_2017\_poster.pdf

### Data

**File name for dataset:** conference\_materials\_2017\_data.csv

### Full names and definitions of column headings

Column Heading

Definition

Possible Values

trial

study trial

org = original trial; rep = replication study

method

search string method

a = method a; b = method b (methods are described in section “Methodological details” below)

database

database data were collected from

pm = PubMed; dss = PubMed Dietary Supplement Subset

date

date data were collected

mode

mode of data extraction

man = manual extraction

three

number of abstracts containing a 0.03\* p-value

four

number of abstracts containing a 0.04\* p-value

five

number of abstracts containing a 0.05\* p-value

six

number of abstracts containing a 0.06\* p-value

common

number of abstracts containing a common statistical analysis

atypical

number of abstracts containing an atypical analysis term

three\_exclusive

number of abstracts containing a 0.03\* p-value and not a 0.04, 0.05 or 0.06\* p-value

four\_exclusive

number of abstracts containing a 0.04\* p-value and not a 0.03, 0.05 or 0.06\* p-value

five\_exclusive

number of abstracts containing a 0.05\* p-value and not a 0.03, 0.04 or 0.06\* p-value

six\_exclusive

number of abstracts containing a 0.06\* p-value and not a 0.03, 0.04 or 0.05\* p-value

common\_exclusive

number of abstracts containing a common statistical analysis term and not an atypical statistical analysis term

atypical\_exclusive

number of abstracts containing an atypical statistical analysis term and not a common statistical analysis term

three\_common

number of abstracts containing a three\_exclusive and common\_exclusive term

four\_common

number of abstracts containing a four\_exclusive and common\_exclusive term

five\_common

number of abstracts containing a five\_exclusive and common\_exclusive term

six\_common

number of abstracts containing a six\_exclusive and common\_exclusive term

three\_atypical

number of abstracts containing a three\_exclusive and atypical\_exclusive term

four\_atypical

number of abstracts containing a four\_exclusive and atypical\_exclusive term

five\_atypical

number of abstracts containing a five\_exclusive and atypical\_exclusive term

six\_atypical

number of abstracts containing a six\_exclusive and atypical\_exclusive term

n\_common

sum of rows columns 6:9

n\_atypical

sum of rows columns 10:13

These data were collected and formatted by Dr. Kroeger.

## Methodological details

### Search string details for method a

```
# p-value bin 0.03: (p=.03*[tiab] OR p=0.03*[tiab])
# p-value bin 0.04: (p=.04*[tiab] OR p=0.04*[tiab])
# p-value bin 0.05: (p 05,05[tiab] OR p 050[tiab] OR p 0500[tiab] OR p 05006[tiab] OR p 0501[tiab] OR p
# p-value bin 0.06: (p=.06*[tiab] OR p=0.06*[tiab])
# common tests: (t-test[tiab] OR anova[tiab] OR ancova[tiab] OR "mixed model"[tiab])
# atypical tests: (nonparametric[tiab] OR non-parametric[tiab] OR wlicoxon-rank[tiab] OR "wilcoxon rank
```

Asterisks in PubMed are used to indicate wildcards. PubMed returns wildcards and shows the terms returned for manual inspection. Expansion of the 0.05\* term above shows these wildcards expanded. Search 0.05\* is expanded to remove inclusion of the commonly found mention of  $p < 0.05$  in abstracts. PubMed interprets

any equality characters ( $<$ ,  $=$ ,  $>$ ) as blank spaces. An asterisk alone could not be used here, as we needed to manually remove references to 0.05. These are not likely to represent values in a bin, because they could represent the entire inequality of  $p < 0.05$  or reference to a significance level threshold.

### Search string details for method b

```
# p-value bin 0.03: same as method a
# p-value bin 0.04: same as method a
# p-value bin 0.05: same as method a
# p-value bin 0.06: same as method a
# common tests: (t-test[tiab] OR "t test" OR t-student[tiab] OR anova[tiab] OR ANOVA[tiab] OR ancova[tiab] OR atypical tests: (nonparametric[tiab] OR non-parametric[tiab] OR "non parametric" OR wilcoxon-mann-whi
```

Reasons for changes:

- Common tests: “t test”, t-student, ANOVA, and “parametric tests” were added as they are relevant common tests, and different versions (i.e. addition or removal of a “-”) yielded additional results.
- Atypical tests: “transformation” was removed, as it was found to yield numerous irrelevant results. “non parametric”, wilcoxon-mann-whitney, mann-whitney, u-test, wilcoxon, log-transformed, and “log transformed” were added, as these terms were found to yield additional relevant results.

### PubMed query data file

The .csv file with the search query conducted in and exported by PubMed could not be located for this study. Instead, notes were located on the the search query obtained for the 2016 abstract. Details on this search query can be found here: (*insert 2016 DOI*). Screenshots of chi-squared tests were located to obtain the data used for this poster and replicate analyses in R for open sharing. To better document the research process and enhance replicability, R and rEntrez were employed to conduct future studies on this topic. Files for this work will be available in the study repository upon completion.

### Analysis code

**File name for analysis code:** conference\_materials\_2017\_code.R

**Study level naming convention:** database\_method\_trial\_mode

- database: pm = PubMed; dss = PubMed Dietary Supplement Subset
- a = method a; b = method b
- trial: org = original; rep = replication
- mode: man = manual search

**Analysis level naming convention:** study\_function

- study: pm\_a\_rep\_man, dss\_a\_rep\_man, pm\_b\_rep\_man, dss\_b\_rep\_man
- function: xsq = chisq.test; pd = percentage deviation

Code was written by Dr. Kroeger, with assistance from Dr. Brown.

### A Note on How to Replicate this Study

Because data were extracted from PubMed manually on a specific date, one would need to download PubMed history and assess the literature from the point in time noted in the data file, using the methods described in this document. Another option might be to run the search described herein and subtract dates from the date reported in our data file. We have not done this ourselves. However, this work does replicate previous findings in the same literature set at a later date.

## Author Contribution

Dr. Kroeger conducted the study, refined the methods, analyzed data, and made the poster. Dr. Brown provided editorial assistance with methods and poster preparation. Dr. Allison provided editorial assistance and is the senior author.

## License Information

These materials are licensed under the Creative Commons Attribution Share Alike 4.0.

**File name for analysis code:** LICENSE.txt

## Citation Information

### Recommended citation for conference\_materials\_2017

Please use the following to cite any of the supporting materials herein:

Kroeger CM, Brown AB, Allison DB. Use of text-mining and comparative analysis to detect p-hacking in dietary supplement scientific literature. Zenodo. 2018. DOI: *(insert DOI)*.

### Recommended citation for published abstract

Please use the following to cite the published abstract:

Kroeger CM, Brown AW, Allison DB. Use of text-mining and comparative analysis to detect p-hacking in dietary supplement scientific literature. 5th Workshop on Biostatistics and Bioinformatics. Atlanta, Georgia, USA. 2017.

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