

An Agenda for Open Science in Communication

Power Analyses

Introduction

In this supplementary material, we conduct several power analyses to get a better idea of the typical power in Communication. However, please note that our calculations cannot measure the actual power in the field: For this, we would need a large scale content analysis. Here, we can only approximate the typical power using several assumptions; the actual power in the field might be different, it could be both lower or higher.

Description of the field Communication

Our measures for the typical sample size and the typical effect size were taken from Rains, S. A., Levine, T. R., & Weber, R. (2018). Sixty years of quantitative communication research summarized: Lessons from 149 meta-analyses. *Annals of the International Communication Association*, 42(2), 105–124. <https://doi.org/10.1080/23808985.2018.1446350>.

The values for the respective topic areas were taken from Table 2 (p. 110). The values for the row “combined” were taken from the text.

Here, it is stated that “The 149 meta-analyses in the sample included 7361 distinct effect estimates and 8,517,714 participants. Effect sizes ranged from $r = .009$ to $.845$ with a mean of $r = .21$ ($SD = .15$) and median of $r = .18$.” (p. 109).

In addition, we also find that “The 149 meta-analyses included an average of 49 effect estimates ($SD = 98.45$, median = 28). In many cases, this value reflected the number of primary studies included in a given meta-analysis. Meta-analyses in the sample involved a mean of 63,094 participants ($SD = 572,231$; median = 4663).”

##	Topic.area	N.analyses	Mean.k	SD.k	Median.k	Mean.n	SD.n	Median.n
## 1	Persuasion	37	51	48.00	38	10213	16697	4269
## 2	Media	35	69	189.00	25	10889	20882	5456
## 3	Interpersonal	34	37	38.00	22	18445	67422	3631
## 4	Instructional	23	44	37.00	29	16069	23131	6206
## 5	Health	15	34	31.00	23	493172	1771956	5866
## 6	Organizational Group	5	53	69.00	19	2565	2497	1956
## 7	Combined	149	49	98.45	28	63094	572	4663

##	Topic.area	Mean.r	SD.r	Median.r	Mean.n.k	Median.n.k
## 1	Persuasion	0.18	0.19	0.13	200	112
## 2	Media	0.20	0.11	0.18	158	218
## 3	Interpersonal	0.24	0.15	0.20	499	165
## 4	Instructional	0.24	0.15	0.22	365	214
## 5	Health	0.18	0.13	0.14	14505	255
## 6	Organizational Group	0.25	0.18	0.22	48	103
## 7	Combined	0.21	0.15	0.18	1288	167

Transformation to other effects sizes

It is possible to directly transform most effect sizes. Here, we transfer the reported effect size r to for example Cohen's d . For more information, see, for example, https://www.psychometrika.de/effect_size.html.

##	Topic.area	Median.r	Median.d	Median.etasq	Median.odds	Median.f
## 1	Persuasion	0.13	0.26	0.03	1.61	0.13
## 2	Media	0.18	0.37	0.06	1.94	0.18
## 3	Interpersonal	0.20	0.41	0.07	2.10	0.20
## 4	Instructional	0.22	0.45	0.08	2.27	0.23
## 5	Health	0.14	0.28	0.04	1.67	0.14
## 6	Organizational Group	0.22	0.45	0.08	2.27	0.23
## 7	Combined	0.18	0.37	0.06	1.94	0.18

Estimated power for correlational designs

Here, we estimate the statistical power for four different potential effect sizes. We use the effect size reported by Reins et al. and three other plausible effect sizes (i.e., small, small to moderate, and moderate effects). As a potential study design, we use the scenario of a typical bivariate correlational between-person design.

##	Topic.area	r=Median.r	r=.10	r=.15	r=.20
## 1	Persuasion	0.28	0.18	0.35	0.57
## 2	Media	0.76	0.31	0.60	0.85
## 3	Interpersonal	0.73	0.25	0.49	0.73
## 4	Instructional	0.90	0.31	0.59	0.84
## 5	Health	0.61	0.36	0.67	0.90
## 6	Organizational Group	0.61	0.17	0.33	0.53
## 7	Combined	0.65	0.25	0.49	0.74

Power analyses for other designs

In this scene, we estimate the statistical power for other typical designs for the actual effect size reported by Rains et al. (2018).

##	Topic.area	Correlation	t-test	ANOVA.2.groups	ANOVA.3.groups	ANOVA.4.groups
## 1	Persuasion	0.28	0.28	0.28	0.21	0.18
## 2	Media	0.76	0.77	0.77	0.67	0.60
## 3	Interpersonal	0.73	0.74	0.74	0.64	0.57
## 4	Instructional	0.90	0.91	0.91	0.84	0.79
## 5	Health	0.61	0.61	0.61	0.51	0.44
## 6	Organizational Group	0.61	0.62	0.62	0.51	0.44
## 7	Combined	0.65	0.65	0.65	0.54	0.48

Conclusion

Our analyses provide some first empirical support for the hypothesis that a large number of studies in Communication are likely to be underpowered. At the same time, please note that we would need a large-scale content analysis of all studies conducted in Communication to measure the actual power typically achieved in Communication. Hence, our result should be treated only as a first proxy.