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# JMASM19: A SPSS Matrix For Determining Effect Sizes From Three Categories: r And Functions Of r, Differences Between Proportions, And Standardized Differences Between Means

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The program is intended to provide editors, manuscript reviewers, students, and researchers with an SPSS matrix to determine an array of effect sizes not reported or the correctness of those reported, such as r-related indices, r-related squared indices, and measures of association, when the only data provided in the manuscript or article are the n, M, and SD (and sometimes proportions and *t* and *F* (1) values) for two-group designs. This program can create an internal matrix table to assist researchers in determining the size of an effect for commonly utilized r-related, mean difference, and difference in proportions indices when engaging in correlational and/or meta-analytic analyses.

Key words: SPSS, syntax, effect size

## Introduction

Cohen (1988) defined effect size as "the *degree* to which the phenomenon is present in the population" (p. 9) or "the degree to which the null hypothesis is false" (p. 10). For many years, researchers, editorial boards, and professional organizations have called for the reporting of effect sizes with statistical significance testing (Cohen, 1965; Knapp, 1998; Levin, 1993; McLean & Ernest, 1998; Thompson, 1994; Wilkinson & The APA Task Force on Statistical Inference, 1999). However, research applied to this issue has indicated that most published studies do not supply measures of effect size with results garnered from statistical significance testing (Craig, Eison, & Metze, 1976; Henson & Smith, 2000; Vacha-Hasse, Nilsson, Reetz, Lance, & Thompson, 2000). When reported with statistically significant results, effect size can provide information pertaining to the extent of the difference between the null hypothesis and the alternative hypothesis. Furthermore, effect sizes can show the magnitude of a relationship and the proportion of the total variance of an outcome that is accounted for (Cohen, 1988; Kirk, 1996; Shaver, 1985).

Conversely, there have long been cautions affiliated with the use of effect sizes. For instance, over 20 years ago, Kraemer and Andrews (1982) pointed out that effect sizes have limitations in the sense that they can be a

> measure that clearly indicates clinical significance only in the case of normally distributed control measures and under conditions in which the treatment effect is additive and uncorrelated with pretreatment or control treatment responses. (p. 407)

Hedges (1981) examined the influence of measurement error and invalidity on effect sizes and found that both of these problems tended to underestimate the standardized mean difference effect size. In addition, Prentice and Miller (1992) ascertained that, "The statistical size of an effect is heavily dependent on the operationalization of the independent variables

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and the choice of a dependent variable" (p. 160). Robinson, Whittaker, Williams, and Beretvas (2003) warned that "depending on the choice of which effect size is reported, in some cases important conclusions may be obscured rather than revealed" (p. 52). Finally, Kraemer (1983), Sawilowsky (2003), and Onwuegbuzie and Levin (2003) cautioned that effect sizes are vulnerable to various primary assumptions. Onwuegbuzie and Levin cited nine limitations affiliated with effect sizes and noted generally that these measures:

> are sensitive to a number of factors, such as: the research objective; sampling design (including the levels of the independent variable, choice of treatment alternatives, and statistical analysis employed); sample size and variability; type and range of the measure used; and score reliability. (p. 135)

Effect sizes fall into three categories: 1) product moment correlation (*r*) and functions of *r*; 2) differences between proportions; and 3) standardized differences between means (Rosenthal, 1991). The first category of effect size, the *r*-related indices, can be considered as based on the correlation between treatment and result (Levin, 1994). For this group, "Effect size is generally reported as some proportion of the total variance accounted for by a given effect" (Stewart, 2000, p. 687), or, as Cohen (1988) delineated this effect size, "Another possible useful way to understand *r* is as a proportion of common elements between variables" (p. 78). Cohen (1988) suggested that for *r*-related indices, values of .10, .30, and .50 should serve as indicators of small, medium, and large effect sizes, while for *r*-related squared indices, values of .01, .09, and .25 should serve as indicators of small, medium, and large, respectively.

The differences between proportions group is constituted in measures, for example, such as the differences between independent population proportions (i.e., Cohen's h) or the difference between a population proportion and .50 (i.e., Cohen's g) (Cohen, 1988). Finally, the standardized differences between means encompasses measures of effect size in terms of mean difference and standardized mean difference such as Cohen's d and Glass' delta. Cohen (1988) defined the values of effect sizes for both the differences between proportions and the standardized differences between means as small = .20, medium = .50, and large = .80. It should be mentioned, however, that it is at the discretion of the researcher to note the context in which small, medium, and large effects are being defined when using any effect size index. As was first discussed by Glass, McGaw, and Smith (1981), and reiterated by Cohen (1988), about these effect size target values and their importance:

> these proposed conventions were set forth throughout with much diffidence, qualifications, and invitations not to employ them if possible. The values chosen had no more reliable a basis than my own intuition. They were offered as conventions because they were needed in a research climate characterized by a neglect of attention to issues of magnitude. (p. 532)

The purpose of this article is to provide editors, manuscript reviewers, students, and researchers with an SPSS (Statistical Package for the Social Sciences) program to determine an array of effect sizes not reported or the correctness of those reported, such as *r*-related indices, *r*-related squared indices, and measures of association, when the only data provided in the manuscript or article are n, M, and SD (and sometimes proportions and *t* and F(1) values) for between-group designs.

Another intention is that this software will be used as an educational resource for students and researchers. That is, the user can run quickly this program and determine the size of the effect. It is not the purpose of this research to serve as an effect size primer and, thus, discuss in-depth the various indices' usage, limitations, and importance. Rather, this program can assist users who have the minimal, proper statistics present to enter into the matrix to derive an effect size index of interest.

In meta-analytic research, it is often difficult to convert study outcomes, via formulae that are accessible over a vast array of the scholarly literature, into a common metric. Thus,

yet another purpose of this program is to offer researchers software that contains many of the formulae used in meta-analyses.

## Methodology

The presented SPSS program will create an internal matrix table to assist researchers and students in determining the size of an effect for commonly utilized *r*-related, mean difference, and difference in proportions indices when engaging in correlational and/or meta-analytic analyses. Currently, the program produces nearly 50 effect sizes (see appendix A for truncated results of the program's ability).

This software program employs mostly data from published articles, and some simulated data, to demonstrate its uses in terms of effect size calculations. Most of the formulae incorporated into this program come from Aaron, Kromrey, and Ferron (1998), Agresti and Finlay (1997), Cohen (1988), Cohen and Cohen (1983), Cooper and Hedges (1994), Hays (1963; 1981), Hedges (1981), Hedges and Olkin (1985), Kelley (1935), Kraemer (1983), Kraemer and Andrews (1982), McGraw and Wong (1992), Olejnik and Algina (2000), Peters and Van Voorhis (1940), Richardson (1996), Rosenthal (1991), and Rosenthal, Rosnow, and Rubin (2000).

It should be noted that with the *r*-related and the standardized differences between means effect sizes, there are numerous, algebraically-related methods concerning how to calculate these indices, of which some of been provided, but not all since the same value(s) would be repeated numerous times (see Cooper & Hedges, 1994 or Richardson, 1996 for the various formulae).

Because this matrix is meant for between-group designs, k = 2, there are some specific assumptions that should be addressed. To run the program, it is assumed that the user has access to either n, M, and, SD or *t* or F(1) values from two-group comparisons. Also, this program was intended for post-test group comparison designs and not, for example, a one-group repeated measures design, which can be found in meta-analytic data sets as well.

Certain effect sizes produced by the program that the user does not wish to view, or that may be nonsensical pertaining to the research of study, should be disregarded. As well, a few of the measures developed for very specific research conditions, such as the Common Language effect size, may not be pertinent to many research situations and should be ignored if this is the case. The Mahalanobis Generalized Distance ($D^2$) is an estimated effect size with p = .5 implemented as the proportion value in the formula. Some of the *r*-related squared indices may contain small values that are negative. This can occur when the MS (treatment) is < the MS (residual) (Peters & Van Voorhis, 1940), or when the t or F values used in the formulae to derive these effect size indices are < 1.00 (Hays, 1963). Finally, even with exact formulas, some of the computed values may be slightly inexact, as could the direction of a value depending on the user's definition of the experimental and control groups.

### Program Description and Output

As presented in the program output found in appendix A, the reader should note that they enter the M, SD, and n for both groups in the first lines of the syntax termed 'test'. If they want to run just one set of data, they put it next to test 1. If more than one set of data are desired, they put the subsequent information in test 2 to however many tests they want to conduct.

The matrix produced will group the effect sizes by the three categories noted previously and also related to an appropriate level of measurement. In parenthesis, after an effect size is displayed in the matrix, is a general explanation of that particular measure and any notes that should be mentioned such as used when there are ESS (equal sample sizes) or PEES (populations are of essentially equal size), yields a PRE (proportional reduction in error) interpretation, or examines the number of CP (concordant pairs) and DP (discordant pairs).

Further, the matrix generates power values, based on calculations of alpha set at the .05 level, related to indices such as Cohen's d, Glass' delta, and Hedges' g. Finally, because some of the standardized differences between means indices produce biased values under various conditions; numerous measures of effect for this group are provided for the user to obtain the proper measure(s) pertaining to specific

circumstances within the research context. The accuracy of the program was checked by an independent source whose hand calculations verified the formulas utilized throughout the program via various situations employing two-group n, M, SD. Appendix B provides the full syntax for this program. To obtain an SPSS copy of the syntax, send an e-mail to the author.

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Appendix A: A Sample of the Program Output.

Descriptive Statistics

| Test | M1 | SD1 | n1 | M2 | SD2 | n2 |
|---|---|---|---|---|---|---|
| 1 | 9.160 | 3.450 | 31 | 5.350 | 3.090 | 31 |
| 2 | 15.950 | 3.470 | 20 | 13.050 | 3.270 | 20 |
| 3 | 31.150 | 10.830 | 27 | 30.370 | 9.410 | 27 |
| 4 | 105.000 | 15.000 | 24 | 95.000 | 15.000 | 24 |

Appendix A: Continued

Standardized Differences Between Means, % of Nonoverlap (with d), and Power

| Glass Delta (Used When There are Unequal Variances and Calculated with the Control Group SD) | Cohens d (Using M & SD Pooled) | Cohens d (Using t Value n1=n2) | Hedges g (Used When There are Small Sample Sizes) | Hedges g (Using t Value n1=n2) | Hedges g (Using Cohens d) | U % of Nonoverlap | Power |
|---|---|---|---|---|---|---|---|
| 1.2330 | 1.1634 | 1.1826 | 1.1488 | 1.1634 | 1.1445 | 61.0362 | .9945 |
| .8869 | .8602 | .8825 | .8431 | .8602 | .8384 | 49.9468 | .7552 |
| .0829 | .0769 | .0784 | .0758 | .0769 | .0754 | 5.9506 | .0589 |
| .6667 | .6667 | .6810 | .6557 | .6667 | .6526 | 41.4105 | .6183 |

Proportion of Variance-Accounted-For Effect Sizes: 2x2 Dichotomous/Nominal

| Phi (The Mean Percent Difference Between Two Variables with Either Considered Causing the Other) | Tetrachoric Correlation (Estimation of Pearsons r for Continuous Variables Reduced to Dichotomies) | Pearsons Coefficient of Contingency (C) (A Nominal Approximation of the Pearsonian correlation r) | Sakodas Adjusted Pearsons C (Association Between Two Variables as a Percentage of Their Maximum Possible Variation) |
|---|---|---|---|
| .4492 | .4492 | .4098 | .5795 |
| .3674 | .3674 | .3449 | .4878 |
| .0384 | .0384 | .0384 | .0542 |
| .3015 | .3015 | .2887 | .4082 |

Proportion of Variance-Accounted-For Effect Sizes: Measures of Relationship(PEES)

| Point Biserial r (Pearsons r for Dichotomous and Continuous Variables) | Biserial r (r for Interval and Dichotomous Variables) | Pearsons r (Using Cohens d with Equal n) | Pearsons r (Using Cohens d with Unequal n) | Pearsons r (If no t Value and for Equal n; Corrected for Bias in Formula) | Pearsons r (Using t Value and for Equal n; Corrected for Bias) | Pearsons r (Using Hedges g with Unequal n) |
|---|---|---|---|---|---|---|
| .5028 | .6300 | .5028 | .5028 | .5090 | .5090 | .5042 |
| .3951 | .4950 | .3951 | .3951 | .4037 | .4037 | .3970 |
| .0384 | .0481 | .0384 | .0384 | .0391 | .0391 | .0386 |
| .3162 | .3962 | .3162 | .3162 | .3223 | .3223 | .3176 |

Appendix A: Continued

Proportion of Variance-Accounted-For Effect Sizes: Univariate Analyses (k=2, ESS)

| R Square (d Value) | R Square (If no t Value and for Unequal n Corrected for Bias in Formula) | R Square (Using t Value and for Unequal n Corrected for Bias) | Adjusted R Square (d Value) | Adjusted R Square (Using t Value and for Unequal n) |
|---|---|---|---|---|
| .2528 | .2591 | .2591 | .2275 | .2339 |
| .1561 | .1630 | .1630 | .1105 | .1177 |
| .0015 | .0015 | .0015 | -.0377 | -.0376 |
| .1000 | .1039 | .1039 | .0600 | .0641 |

Proportion of Variance-Accounted-For Effect Sizes: Univariate Analyses (k=2, ESS)

| Eta Square (Squared Correlation Ratio or the Percentage of Variation Effects Uncorrected for a Sample) | Eta Square (Calculated with F Value) | Omega Square (Corrected Estimates for the Population Effect) | Estimated Omega Square | Epsilon Square (Percentage of Variation Effects Uncorrected for a Sample | Epsilon Square (Calculated with F Value) |
|---|---|---|---|---|---|
| .2528 | .2591 | .2528 | .2437 | .2404 | .2467 |
| .1561 | .1630 | .1561 | .1379 | .1339 | .1409 |
| .0015 | .0015 | .0015 | -.0173 | -.0177 | -.0177 |
| .1000 | .1039 | .1000 | .0828 | .0804 | .0844 |

Appendix B: Program Syntax

```
* Data enter *.
data list list /testno(f8.0) exprmean exprsd(2f9.3) exprn(f8.0)contmean contsd(2
f9.3) contn(f8.0).
* Put the M, SD, n for the Experimental Group followed by the Control Group.
Begin data

1      9.16   3.45   31           5.35   3.09   31
2      15.95  3.47   20           13.05  3.27   20
3      31.15  10.83  27           30.37  9.41   27
4      105    15     24           95     15     24
end data.
*************************************************************************
Example References
1   Example of t and Cohen's d          JEE (2002), 70(4),356-357
2   Example of F, Cohen's d, and Eta2          JEE (2002), 70(3),235
3   Example of t and Eta2               JEE (2002), 70(4),305-306
4   Example of d, r, r2, and CL         Psych Bulletin (1992), 111(2),363
*************************************************************************.
```

Appendix B: Continued

```
compute poold = ((exprn-1)*(exprsd**2)+(contn-1)*(contsd**2))/((exprn+contn)-2) .
compute glassdel = (exprmean-contmean)/contsd.
compute cohend = (exprmean-contmean)/sqrt(poold).
compute clz = (exprmean-contmean)/sqrt(exprsd**2 + contsd**2).
compute cl = CDFNORM(clz)*100.
compute akf1 = (exprn+contn)**2.
compute akf2 = 2*(exprn+contn).
compute akf3 = akf1-akf2.
compute akf4 = (akf3)/(exprn*contn).
compute r2akf = (cohend**2)/(cohend**2+akf4).
compute rakf = SQRT (r2akf).
compute hedgesg = cohend*(1-(3/(4*(exprn+contn)-9))).
compute ub = CDF.NORMAL((ABS(cohend)/2),0,1).
compute U = (2*ub-1)/ub*100.
compute critical = 0.05.
compute h = (2*exprn*contn)/(exprn+contn).
compute ncp = ABS((cohend*SQRT(h))/SQRT(2)).
compute alpha = IDF.T(1-critical/2,exprn+contn-2).
compute power1 = 1-NCDF.T(alpha,exprn+contn-2,NCP).
compute power2 = 1-NCDF.T(alpha,exprn+contn-2,-NCP).
compute B = power1 + power2.
compute f2 = cohend ** 2 / 4 .
compute f = ABS(cohend/2).
compute eta2 = (f2) / (1 + f2) .
compute eta = SQRT(eta2).
compute epsilon2 = 1-(1-eta2) * (exprn  +  contn-1) / (exprn  +  contn-2).
compute ttest = cohend  * SQRT((exprn  *  contn) /( exprn  +  contn)).
compute cohenda = 2*ttest/SQRT(exprn  +  contn-2).
compute hedgesa = 2*ttest/SQRT(exprn  +  contn).
compute hedgesb = cohend*SQRT((exprn  +  contn-2)/(exprn + contn)).
compute hedgesn = (exprn  +  contn)/(2).
compute hedgesnh = 1/(.5*((1/exprn) + (1/contn))).
compute hedgesnn = sqrt(hedgesn/hedgesnh).
compute r1= ttest/SQRT((ttest**2)+ exprn  +  contn-2).
compute r = cohend/SQRT(cohend ** 2 + 4) .
compute rd = cohend/SQRT((cohend ** 2 + 4*(hedgesnn))).
compute rg = hedgesg/SQRT((hedgesg ** 2 + 4*(hedgesnn)*((exprn  +  contn-2)/(exprn + contn)))).
compute phi = (r **2/(1+r **2)) **.5.
compute phi2 = phi **2.
compute taub = SQRT(phi **2).
compute gktau = phi **2.
compute zr = .5 * LN((1 + r) / (1 - r)) .
compute zrbias = r/(2*(exprn + contn-1)).
compute zrcor = zr - zrbias.
compute rsquare = r **2 .
compute rsquare1 = r1**2.
compute adjr2 = rsquare - ((1-rsquare)*(2/(exprn  +  contn -3)))  .
compute adjr2a = rsquare1 - ((1-rsquare1)*(2/(exprn  +  contn -3)))  .
compute adjr2akf = r2akf - ((1-r2akf)*(2/(exprn  +  contn -3)))  .
compute k = SQRT(1-r **2).
compute k2 = k **2.
compute lambda = 1-rsquare.
compute rpbs = SQRT(eta2).
compute rbs = rpbs*1.253.
compute rpbs2 = rpbs **2.
compute ftest = ttest **2.
compute omega2 = ftest / ((exprn  +  contn) + ftest).
compute estomega = (ttest**2-1)/(ttest**2 + exprn + contn -1).
```

Appendix B: Continued

```
compute eta2f = (ftest)/(ftest + exprn + contn -2).
compute esticc = (ftest-1)/(ftest + exprn + contn -2).
compute c = SQRT(chi/ (exprn + contn+chi)).
compute adjc = c/SQRT(.5).
compute cramer = SQRT(chi/ (exprn + contn*1)).
compute cramer2 = cramer **2.
compute t = SQRT(chi/ (exprn + contn*1)).
compute t2 = cramer **2.
compute d2 = r **2/(r **2+1).
compute w = SQRT (c **2/(1-c **2)).
compute w2 = w **2.
compute percenta = exprmean/(exprmean+contmean).
compute percentb = exprsd/(exprsd+contsd).
compute percentd = percenta-percentb.
compute p = (exprmean*contsd)-(exprsd*contmean).
compute q = (exprmean*contsd)+(exprsd*contmean).
compute yulesq = p/q.
compute taua = ((p-q)/((exprn+contn)*(exprn + contn-1)/2)).
compute rr = (exprmean/(exprmean+contmean))/(exprsd/(exprsd+contsd)).
compute rrr = 1-rr.
compute odds = (exprmean/contmean)/(exprsd/contsd).
compute tauc = 4*((p-q)/((exprn+contn)*(exprn+contn))).
compute zb = SQRT(chi).
compute coheng = exprsd - .50.
compute cohenh = 2 * ARSIN(SQRT(.651)) - 2 * ARSIN(SQRT(.414)).
compute cohenq = .55-zr.
execute.

* FINAL REPORTS *.
FORMAT poold to cohenq (f9.4).
VARIABLE LABELS testno 'Test'/ exprmean 'M1'/ exprsd 'SD1'/ exprn 'n1'/contmean 'M2'/ contsd 'SD2'/contn 'n2'
/glassdel 'Glass Delta'/ cohend 'Cohens d (Using M & SD)'/ U 'U % of Nonoverlap'/ B 'Power'/ hedgesg 'Hedges g'
/cohenda 'Cohens d (Using t Value n1=n2)'/hedgesa 'Hedges g (Using t Value n1=n2)'/hedgesb 'Hedges g (Using Cohens
d)'/rd 'Pearsons r (Using Cohens d with Unequal n)'/ rg 'Pearsons r (Using Hedges g with Unequal n)'/ f2 'f Square (Proportion
of Variance Accounted for by Difference in Population Membership)' /r2akf 'R Square (If no t Value and for Unequal n
Corrected for Bias in Formula)'/eta2 'Eta Square (Squared Correlation Ratio or the Percentage of Variation Effects
Uncorrected for a Sample)' /epsilon2 'Epsilon Square (Percentage of Variation Effects Uncorrected for a Sample' / omega2
'Omega Square (Corrected Estimates for the Population Effect)' /r 'Pearsons r (Using Cohens d with Equal n)' /r1 'Pearsons r
(Using t Value and for Equal n; Corrected for Bias)' /rakf 'Pearsons r (If no t Value and for Equal n; Corrected for Bias in
Formula)' /phi 'Phi (The Mean Percent Difference Between Two Variables with Either Considered Causing the Other)' /phi2
'Phi Coefficient Square (Proportion of Variance Shared by Two Dichotomies)' /zr 'Fishers Z (r is Transformed to be Distributed
More Normally)'/w2 'w Square (Proportion of Variance Shared by Two Dichotomies)' /coheng 'Cohens g (Difference Between a
Proportion and .50)' /cohenh 'Cohens h (Differences Between Proportions)' /cohenq 'Cohens q (One Case & Theoretical Value
of r)' /rsquare 'R Square (d Value)' /rsquare1 'R Square (Using t Value and for Unequal n Corrected for Bias)'/adjr2 'Adjusted R
Square (d Value)'/adjr2a 'Adjusted R Square (Using t Value and for Unequal n)'/adjr2akf 'Adjusted R Square (Unequal n and
Corrected for Bias)'/ lambda 'Wilks Lambda (Small Values Imply Strong Association)' / t2 'T Square (Measure of Average
Effect within an Association)' /d2 'D2 Mahalanobis Generalized Distance (Estimated with p = .5 as the Proportion of Combined
Populations)' /rpbs 'Point Biserial r (Pearsons r for Dichotomous and Continuous Variables)' /rbs 'Biserial r (r for Interval and
Dichotomous Variables)'/rpbs2 'r2 Point-Biserial (Proportion of Variance Accounted for by Classifying on a Dichotomous
Variable Special Case Related to R2 and Eta2)' / f 'f (Non-negative and Non-directional and Related to d as an SD of
Standardized Means when k=2 and n=n)' /k2 'k2 (r2/k2: Ratio of Signal to Noise Squared Indices)' / k 'Coefficient of Alienation
(Degree of Non-Correlation: Together r/k are the Ratio of Signal to Noise)' /c 'Pearsons Coefficient of Contingency (C) (A
Nominal Approximation of the Pearsonian correlation r)' /adjc 'Sakodas Adjusted Pearsons C (Association Between Two
Variables as a Percentage of Their Maximum Possible Variation)' /cramer 'Cramers V (Association Between Two Variables as
a Percentage of Their Maximum Possible Variation)'/odds 'Odds Ratio (The Chance of Faultering after Treatment or the Ratio
of the Odds of Suffering Some Fate)'/ rrr 'Relative Risk Reduction (Amount that the Treatment Reduces Risk)'/ rr 'Relative Risk
Coefficient (The Treatment Groups Amount of the Risk of the Control Group)'/ percentd 'Percent Difference'/ yulesq 'Yules Q
(The Proportion of Concordances to the Total Number of Relations)'/ t 'Tshuprows T (Similar to Cramers V)' /w 'w (Amount of
Departure from No Association)' /chi 'Chi Square(1)(Found from Known Proportions)' /eta 'Correlation Ratio (Eta or the Degree
of Association Between 2 Variables)'/eta2f 'Eta Square (Calculated with F Value)'/epsilonf 'Epsilon Square (Calculated with F
Value)'/esticc 'Estimated Population Intraclass Correlation Coefficient'/estomega 'Estimated Omega Square'/zrcor 'Fishers Z
```

Appendix B: Continued

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Corrected for Bias (When n is Small)'/cl 'Common Language (Out of 100 Randomly Sampled Subjects (RSS) from Group 1 will
have Score > RSS from Group 2)'/ taua 'Kendalls Tau a (The Proportion of the Number of CP and DP Compared to the Total
Number of Pairs)'/ tetra 'Tetrachoric Correlation (Estimation of Pearsons r for Continuous Variables Reduced to
Dichotomies)'/taub 'Kendalls Tau b (PRE Interpretations)'/ gktau 'Goodman Kruskal Tau (Amount of Error in Predicting an
Outcome Utilizing Data from a Second Variable)'/cramer2 'Cramers V Square'/ tauc 'Kendalls Tau c (AKA Stuarts Tau c or a
Variant of Tau b for Larger Tables)'/.

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REPORT FORMAT=LIST AUTOMATIC ALIGN(CENTER)
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REPORT FORMAT=LIST AUTOMATIC ALIGN(CENTER)
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MARGINS (*,90)
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REPORT FORMAT=LIST AUTOMATIC ALIGN(CENTER)
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  /TITLE "Proportion of Variance-Accounted-For Effect Sizes: 2x2 Dichotomous/Nominal".
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  /VARIABLES=gktau
  /TITLE "Proportion of Variance-Accounted-For Effect Sizes: 2x2 PRE Measures".
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  /TITLE "Proportion of Variance-Accounted-For Effect Sizes:Measures of Relationship(PEES)".
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