

QuOCCA

Quality Output Checklist and Content Assessment

This checklist is intended for peer-reviewed research papers. It should not be used for reviews, chapters, editorials etc.

Manuscript Title:			
Manuscript Authors:			
Person submitting this form:			
Date:			
TRANSPARENCY:	N/A	YES	NO
1a. Were the study's hypotheses and analyses plans registered prior to the conduct of the study (i.e. pre-registered)?		<input type="checkbox"/>	<input type="checkbox"/>
b. If so, was the main conclusion reported in the abstract (or summary) based on the primary hypothesis/outcome?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Are the primary data accessible to independent researchers on a public website?		<input type="checkbox"/>	<input type="checkbox"/>
3. Is code used for the study available on a public website to allow for reproduction or analysis of data?		<input type="checkbox"/>	<input type="checkbox"/>
DESIGN AND ANALYSIS:	N/A	YES	NO
4. Was ethics approval obtained?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5a. Was the sample size based on a formal sample size calculation done prior to starting the study?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. If so, was the planned sample size adhered to?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Was data analysis blinded ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
REPORTING PRACTICES:	N/A	YES	NO
7. Are any reporting guidelines specified (such as those found at www.equator-network.org)?		<input type="checkbox"/>	<input type="checkbox"/>
8a. Are all measures of variability defined in figures, tables and text?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Are any data summarised using standard error of the mean (SEM)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. If the SEM is used, are sample sizes specified for all reported SEM?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9a. Were any data excluded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. If so, was a criterion given?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10a. If null-hypothesis testing of significance was used, is a probability threshold specified for all statistical tests?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. If used, are exact probability values used throughout the report, excluding figure legends?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Are claims made for the importance or significance of results associated with a P-value greater than or equal to 0.05 (or other threshold) i.e. misleading spin of reported results?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

QuOCCA

Quality Output Checklist and Content Assessment

OVERVIEW

The QuOCCA is a critical appraisal tool intended to assess the trustworthiness of published, peer reviewed original research papers. It is not suitable for book chapters, editorials, consensus statements, reviews of any sort and letters. The trustworthiness is assessed through appraising aspects of scientific quality and adoption of reproducible/replicable research practices.

The QuOCCA is not intended to generate an overall score, but instead reveal study strengths and weaknesses across a variety of critical domains.

These cheatsheets provide definitions of key terms, possible answers for each question, and examples.

GUIDELINES FOR ASSESSMENT

All questions and sub-questions must be completed. If one or more do not apply, select N/A.

If you have a situation that you consider falls in a grey zone/area, give the benefit of the doubt to the authors.

Q1 Were the study's hypotheses and analyses plans **registered** prior to the conduct of the study? If so, was the main conclusion reported based on the **primary hypothesis**?

DEFINITIONS

Registered. Involves creating a permanent record of study plans before collecting data, or before looking at data. The plan, which includes the hypotheses, methods and analysis plan, is stored in a date-stamped, uneditable file (usually online). A trial embedded within a large registered trial may not itself be registered.

Primary hypothesis. The primary focus of the study. Values related to the primary hypothesis are used in sample size calculations.

POSSIBLE ANSWERS

Registration?

No: The study does not report preregistration.

Yes: The study reports and provides evidence of preregistration.

Primary hypothesis?

NA: Not a registered study.

No: Main conclusion not based on primary hypothesis.

Yes: Main conclusion based on primary hypothesis.

EXAMPLES

"The current exploratory study investigated the effect of electrical brain stimulation on olfactory sensitivity. [...] We found no evidence that brain stimulation alters olfactory sensitivity."

Registered: **No**

Main conclusion based on primary hypothesis: **NA**

"We hypothesised that individuals with Parkinson's disease will have greater anxiety in the Wine Spill Stress Test. [...] All analyses were pre-planned. [...] In line with our main hypothesis, individuals with Parkinson's disease had ~2.6 times more anxiety than healthy controls in a stressful fine-motor task."

Registered? **No**

Main conclusion based on primary hypothesis: **NA**

"We hypothesised that individuals with Parkinson's disease will have greater anxiety in the Wine Spill Stress Test. [...] All analyses were pre-planned and pre-registered (<https://osf.io/xktjf/>). [...] The key finding from the present study was that, in individuals with Parkinson's disease, performance of a stressful fine-motor task was inversely related to daily levodopa dosages."

Registered? **Yes**

Main conclusion based on primary hypothesis: **No**

"We hypothesised that individuals with Parkinson's disease will have greater anxiety in the Wine Spill Stress Test. [...] All analyses were pre-planned and pre-registered (<https://osf.io/xktjf/>). [...] In line with our main hypothesis, individuals with Parkinson's disease had ~2.6 times more anxiety than healthy controls in a stressful fine-motor task."

Registered? **Yes**

Main conclusion based on primary hypothesis: **Yes**

Q2 Are the **primary data accessible** to independent researchers on a public website?

DEFINITIONS

Primary data. The minimum data that is needed to independently verify research results.

Public website. A site that is not behind a paywall, or password protected.

POSSIBLE ANSWERS

No

The study did not make the minimum data publically available.

Yes

The study did make the minimum data publically available.

EXAMPLES

"Informed consent given by study participants did not include data sharing with third parties. Anonymized data can be made available to investigators for targeted non-commercial research based on a motivated request to be submitted to John Do and pending ethical clearance by each of the 13 participating centers."

Primary data available? **No**

"With regard to data availability, ethical restrictions prevent deposition in a public repository. Data will be made available from the University of Research Excellence Sensorimotor Physiology Laboratory for researchers who meet the criteria for access to confidential data."

Primary data available? **No**

"All data and computer code used to compute numerical results and generate Figs 3 to 8 are available from github.com/John_Do/J_Good_Research_2019."

Primary data available? **Yes**

"Data Availability: All relevant data are within the manuscript and its Supporting Information files."

Primary data available? **Yes**

"All data and code are available on the Open Science Framework (https://osf.io/ajq2e/?view_only=45d227ed511047bv84a55030d72e054d)."

Primary data available? **Yes**

Q3 Is **code used for the study available** on a public website to allow for reproduction or analysis of data?

DEFINITIONS

Code. Computer code used to generate reported results. Making it available (along with the data) allows readers to replicate the published results. Examples include software scripts for data and statistical analyses (custom or generated by commercial software), and spreadsheet documents with formulas.

Public website. A site that is not behind a paywall, or password protected.

POSSIBLE ANSWERS

No

The study does not make code publically available.

Yes

The study makes code publically available.

EXAMPLES

"The Matlab code used to generate the results is available upon request."
Code made publically available? **No**

"SPSS was used for all statistical analysis."
Code made publically available? **No**

"All data and computer code used to compute numerical results and generate Figs 3 to 8 are available from github.com/JohnDo/J_Good_Research_2019"
Code made publically available? **Yes**

"All data and code are available on the Open Science Framework (https://osf.io/ajq2e/?view_only=45b322ed119047bd84a56030d72e094d)."
Code made publically available? **Yes**

Q4 Was **ethics** approval obtained?

DEFINITIONS

Ethics approval. Many types of studies involving participants/subjects (whether human or not), or their data or tissue must have ethical approval from an appropriate institutional ethics committee.

POSSIBLE ANSWERS

NA

The study did not require ethical approval (e.g. computer simulation, commercial cell lines).

No

The paper did not report obtaining ethics approval.

Yes

The paper reported obtaining ethics approval.

EXAMPLES

"The current study recruited 14 participants from the local undergraduate population. [No mention of ethical approval]."

Ethics approval obtained? **No**

"Ethics approval: The University of Excellent Research Human Ethics Committee approved this study (HEC 18/32)."

Ethics approval obtained? **Yes**

"The experimental procedures adhered to the standards set by the Declaration of Helsinki, except for registration in a database, and were approved by the Human Investigations Committees of Jo John University and Veterans Affairs Medical Centre (No. 04543G5Q)."

Ethics approval obtained? **Yes**

Q5 Was the **sample size** based on a formal sample size calculation done prior to starting the study? If so, was the planned sample size adhered to?

DEFINITIONS

Sample size calculation. A formal calculation based on effect size, data variability, statistical power and threshold for statistical significance. It can also be based on a desired level of certainty (i.e. planning for precision). This is not required for a case study.

SCOPE

Usually reported in Methods, but could be in a linked online registration document.

POSSIBLE ANSWERS

Sample size calculation?

NA: No sample size (e.g. simulation, meta-analysis, systematic review).

No: No sample size calculation.

Yes: Sample size calculation performed.

Sample size adhered to?

No: Not adhered to.

Yes: Adhered to.

EXAMPLES

"The sample size of the current study was based on Dustker et al. (2017) who, in 14 subjects, found statistically significant effects of light exposure on haemoglobin levels."

Sample size calculation? **No**

Sample size adhered to? **NA**

"The sample size was calculated on the basis of the primary outcome. Fall rates of 60% in the control arm and 33% in the intervention arm were estimated based on previous studies [3, 5]. Accounting for dropouts (10%), power of 90%, and a 5% significance level, a total sample of 234 was calculated. During recruitment (April 2011-May 2014), paramedics referred 684 potential participants of which 221 were enrolled. Funding constraints precluded further enrolment."

Sample size calculation? **Yes**

Sample size adhered to? **No**

"A sample size calculation (5% significance level, 80% power, 33% effect, 20% dropout rate) was performed and indicated a sample size of 750 will be necessary for this study. [...] A total of 750 subjects were recruited to participate in the study."

Sample size calculation? **Yes**

Sample size adhered to? **Yes**

"This study reports neuropsychological assessment of a person with familial nodular blepharitis."

Sample size calculation? **NA**

Sample size adhered to? **NA**

Q6 Was data analysis **blinded**?

DEFINITIONS

Blinded analysis. Analysis where the person running the statistical analysis is blind to the condition/group associated with the data, and this is maintained until the results are known.

POSSIBLE ANSWERS

NA

No blinding possible. For example, computer simulations and some case studies.

No

The article does not report that data analysis was blinded.

Yes

The article reports that data analysis was blinded.

EXAMPLES

"This computer simulation investigated the effects of hyperactive and hypoactive ion gate channels on the excitability of layer VII neurons."

Was data analysis blinded? **NA**

"We conducted a systematic review to identify randomised trials comparing support surfaces for pressure ulcer prevention."

Was data analysis blinded? **NA**

"A customized script was used to extract breath-by-breath data at each mandibular advancement position followed by manual review to ensure signal integrity."

Was data analysis blinded? **No**

"Prior to formally analysing the data, the authors independently inspected blinded scatter plots of the raw data. Authors remained blinded until after the statistical analyses were performed."

Was data analysis blinded? **Yes**

"To ensure that the patient, principal investigator, surgeon, and statistician were unaware of which medication was administered at each surgery, the corticosteroid capsules were of the same colour and size, were stored in similar bottles, and were coded as drug 1 or drug 2. The drugs used in the different surgeries were only revealed after the acquisition and analysis of all data."

Was data analysis blinded? **Yes**

"Clinicians and gait assessors were blinded to the treatment group"

Was data analysis blinded? **No**

Q7 Are any **reporting guidelines** specified (such as those found at www.equator-network.org)?

DEFINITIONS

Reporting guideline. Minimum list of information needed to ensure a manuscript can be: understood by readers, replicated by a researcher, used by a doctor to make a clinical decision, or included in a systematic review. The majority of reporting guidelines can be found at www.equator-network.org.

POSSIBLE ANSWERS

No

The use of a reporting guideline is not specified in the article.

Yes

The use of a reporting guideline is specified in the article.

EXAMPLES

"The Methods and Results are reported in detail."

Were reporting guidelines specified? **No**

"We conducted a multicentre, randomized controlled trial (RCT) in accordance with the CONSORT guidelines."

Were reporting guidelines specified? **Yes**

"This study followed STROBE guidelines."

Were reporting guidelines specified? **Yes**

"The present protocol followed the SPIRIT guidelines and fulfilled the SPIRIT checklist."

Were reporting guidelines specified? **Yes**

"Methodologic quality assessment was performed for in vivo animal studies according to ARRIVE guidelines."

Were reporting guidelines specified? **Yes**

Q8 Are all **measures of variability** defined? Are any written measures that summarize data variability defined as SEM? If the SEM is used, are sample sizes specified for all SEM?

DEFINITIONS

Measures of variability. Standard deviation (SD), standard error of the mean (SEM), confidence interval (CI), interquartile range (IQR), range.

SCOPE

Values reported in the main text of the article, tables or figures.

Measures of variability reported in the Abstract must be explicitly defined.

Note the SE can be used in the statistical assessment of models, but it is excluded for this question.

POSSIBLE ANSWERS

All measures of variability defined?

NA: No such measures are reported.

No: Not all measures defined.

Yes: All measures defined.

Are any measures SEM?

NA: No measures of variability reported.

No: No measures defined as SEM.

Yes: Some measures defined as SEM.

For SEM, sample size reported?

NA: No SEM reported.

No: Sample size not reported.

Yes: Sample size reported.

EXAMPLES

"The mean response of the computer simulation was 4.561 microlitres. Table 1 includes the mean response for all other simulations."

All measures of variability defined? **NA**

Any measures SEM? **NA**

For SEM, sample size reported? **NA**

"The cats weighed 1.6±0.4 kg (mean±SEM, n=4), and the amount of food they ate varied considerably (100 g/day [50-375]; median [range])."

All measures of variability defined? **Yes**

Any measures SEM? **Yes**

For SEM, sample size reported? **Yes**

"The cats weighed 1.6±0.4 kg (mean±SEM), and the amount of food they ate varied considerably (100 g/day [50-375]; median [range])."

All measures of variability defined? **Yes**

Any measures SEM? **Yes**

For SEM, sample size reported? **No**

"The cats weighed 1.6±0.4 kg (mean±SD), and the amount of food they ate varied considerably (100 g/day [50-375]; median [range])."

All measures of variability defined? **Yes**

Any measures SEM? **No**

For SEM, sample size reported? **NA**

"The cats weighed 1.6±0.4 kg (mean±SD), and the amount of food they ate varied considerably (100 g/day [50-375])."

All measures of variability defined? **No**

Any measures SEM? **No**

For SEM, sample size reported? **NA**

"Abstract: [...] The overall effect of catnip was 5.2 (1.2) [...]. Results: The cats weighed 1.6±0.4 kg (mean±SD), and the amount of food they ate varied considerably (100 g/day [50-375]; median [range])."

All measures of variability defined? **No**

Any measures SEM? **No**

For SEM, sample size reported? **No**

Q9 Were any data excluded? If so, was a criterion given?

DEFINITIONS

Exclusion. Data, samples etc. excluded from the analysis/dataset.

Criterion. A value or other rule that can be reliably used by others to exclude data: a criterion cannot be subjective or vague.

SCOPE

Only relates to instances where the article reports data were excluded. It does not cover initial screening of participants etc.

POSSIBLE ANSWERS

Exclusion reported

NA: No data analysed or reported.

No: No mention of data being excluded.

Yes: Mention of data being excluded.

Criterion provided

NA: Answered "No" to above question.

No: No criterion provided.

Yes: Criterion provided.

EXAMPLES

"For each experimental condition, the five responses were averaged and used for statistical analysis."

Was any data excluded? **No**

If so, was a criterion given? **NA**

"A total of 24 subjects were recruited for the study. [...] As can be seen in Fig. 1, the mean response across the 23 subjects was 4.2 cm (SD 1.9)."

Was any data excluded? **Yes**

If so, was a criterion given? **No**

"For the sub-analysis, groups were divided by their g-protein phenotype. Because the AR-576 g-protein group only had 4 participants, data from this group were not included in the sub-analysis."

Was any data excluded? **Yes**

If so, was a criterion given? **Yes** (they belonged to a specific group)

"Five data points from four participants were identified as clear outliers: they were uncharacteristically different from the other responses from that participant at a given position."

Was any data excluded? **Yes**

If so, was a criterion given? **No**

"Five data points from four participants were identified as clear outliers: they were uncharacteristically different from the other responses from that participant at a given position (>10 cm)."

Was any data excluded? **Yes**

If so, was a criterion given? **Yes**

Q10 If null-hypothesis testing of significance was used, is a **probability threshold** specified for all statistical tests? If used, are exact p-values used throughout?

DEFINITIONS

Null-hypothesis significance testing (NHST). A method of statistical inference where an experimental factor is tested against a hypothesis of no effect or no relationship.

Probability threshold. A p-value or alpha level used to determine whether or not to reject the null hypothesis.

SCOPE

P-values in the Abstract, the main text of the paper and tables; excludes p-values in figures (e.g. * $p < 0.05$; † $p < 0.001$)

POSSIBLE ANSWERS

Probability threshold mentioned?

NA: NHST not used.

No: NHST used, but probability threshold not specified.

Yes: NHST used and probability threshold specified.

Exact values used?

NA: NHST not used.

No: Exact values not used throughout.

Yes: Exact values used throughout.

EXAMPLES

"Data were analysed using an estimation approach based on confidence intervals."

Probability threshold specified for all tests? **NA**

Exact throughout? **NA**

"In this analysis changes were evaluated using Friedman's test and a post-hoc analysis based on Dunn-Sidak's criterion . [...] Overall there was a main effect of time ($p < 0.05$), with post-hoc comparisons finding a difference between 1 and 5 min ($p < 0.01$) and 1 and 10 min ($p < 0.05$), but not one and 20 min ($p > 0.05$)."

Probability threshold specified for all tests? **No**

Exact throughout? **No**

"Alpha was set to 0.05 for all statistical tests. [...] Overall, men were slower than women ($p = 0.002$), but this was only true for the first day of training ($p = 0.007$); all other days were similar between genders ($p > 0.05$)."

Probability threshold specified for all tests? **Yes**

Exact throughout? **No**

"One-way ANOVAs were used to analyse the data, followed by Fischer's LSD posthoc tests if $P < 0.05$. [...] There was a significant time x group interaction, with a significant difference between men and women at 10 min (LSD $p < 0.05$)."

Probability threshold specified for all tests? **No** (no threshold for LSD)

Exact throughout? **No**

"Statistical significance was set at $\alpha = 0.001$. [...] There was a main effect of side ($p = 0.002$) as well as a main effect of handedness ($p < 0.001$). However, the interaction was not statistically significant ($p = 0.072$)."

Probability threshold specified for all tests? **Yes**

Exact throughout? **Yes**

Q11 Are claims made for the importance or significance of results associated with a P-value greater than or equal to 0.05 (or other threshold) i.e. spin?

DEFINITIONS

Spin. Making claims of the importance or significance of data obtained with a p-value larger than the pre-specified threshold (generally 0.05).

SCOPE

Spin can be difficult to identify in the Discussion. Thus, this question focuses only on spin in the Abstract, Methods and Results.

POSSIBLE ANSWERS

Spin

NA: Paper did not report p-values, or does not contain p-values ≥ 0.05 .

No: The paper does not make claims of the importance of results associated with p-values ≥ 0.05 .

Yes: The paper makes claims of the importance of results associated with p-values ≥ 0.05 .

EXAMPLES

"Overall, there was a significant difference between men and woman ($p=0.003$), but not between left and right hands ($p=0.16$)."

Spin: **No**

"For flexion, matched torques in the self-initiated condition was not stastically different from baseline ($p=0.085$). Similarly, Analysis of CCI levels across the adaptation phase showed that the effect of group was not statistically significant ($P=0.102$)."

Spin: **No**

"Analysis of CCI levels across the adaptation phase showed that the effect of group approached significance ($P=0.052$). However, the effect of time was not statistically significant ($p=0.2$)."

Spin: **Yes**

"For flexion, there was a nonsignificant trend for reduced matched torques in the self-initiated condition ($p=0.085$). Moreover, there was a 9% increase in H-reflex amplitude following the experimenter-initiated trials, although this increase was not statistically significant ($p=0.14$)"

Spin: **Yes**

"Analysis of large spontaneous events showed the frequency to be increased from 0.4 ± 0.1 Hz to 0.8 ± 0.2 Hz ($P < 0.05$). However, there was only a non-significant trend between young and old mice."

Spin: **Yes (spin is implied)**