Preregistration for Quantitative Research in Psychology (PRP-QUANT) Template

Title

T1 Title
The title should be focused and descriptive, using relevant key terms to reflect what will be done in the study. Use title case (https://apastyle.apa.org/style-grammar-guidelines/capitalization/title-case).
Towards Sustainable and Usable Data Sharing Practices in Psychology: Providing an empirical test on the usability of a new documentation standard for psychological research data

T2 Contributors, Affiliations, and Persistent IDs (recommend ORCID iD)
Provide in separate entries the full name of each contributor, each contributor's professional affiliation, and each contributor's persistent ID. See ORCID iD for an example of persistent ID (https://orcid.org/). Optional: include the intended contribution of each person listed (e.g. statistical analysis, data collection; see CRediT, https://casrai.org/credit/).
Dr. Katarina Blask, Leibniz-Institute for Psychology, https://orcid.org/0000-0003-2062-4059; involved in conceptualization, data curation, formal analysis, investigation, methodology, project administration, supervision, writing the original draft as well as reviewing and editing the draft
Marc Latz, Leibniz-Institute for Psychology, https://orcid.org/0000-0001-6737-9690; intended contribution: conceptualization, data curation, formal analysis, investigation, methodology, software development, writing the original draft as well as reviewing and editing the draft
Marie-Luise Müller, Leibniz-Institute for Psychology; intended contribution: conceptualization, data curation, methodology, writing the original draft as well as reviewing and editing the draft
Stephanie Kraffert, Leibniz-Institute for Psychology; intended contribution: formal analysis, methodology, writing the original draft as well as reviewing and editing the draft
Nina Schröder, Leibniz-Institute for Psychology; intended contribution: formal analysis, methodology, writing the original draft as well as reviewing and editing the draft

T3 Date of Preregistration

This is assigned by the system upon preregistration submission.

19.07.2021

T4 Versioning information

This is assigned by the system upon submission of original and subsequent revisions. Should be a persistent identifier, if not a DOI.

T5 Identifier

This unique identifier is assigned by the system upon submission.

T6 Estimated duration of project

Include best estimate for how long the project will take from preregistration submission to project completion.

8-10 weeks

T7 IRB Status (Institutional Review Board/Independent Ethics Committee/Ethical Review Board/Research Ethics Board)

If the study will include human or animal subjects, provide a brief overview of plans for the treatment of those subjects in accordance with established ethical guidelines. If appropriate institutional approval has been obtained for the study, provide the relevant identifier here. If the study will be exempt from ethical board review, provide reasoning here.

In this study, the existing EU General Data Protection Regulation as well as the principles for ensuring good scientific practice of the University of Trier as well as the Leibniz Institute of Psychology are complied with. According to human judgement, there are no risks for the participants. Furthermore, we follow the recommendations of the DGPs on the management and provision of research data in psychology (Gollwitzer et al., 2020) when processing and archiving the data for digital long-term preservation. Inclusion of participants in the study will only take place after written informed consent has been obtained.

The approval of the ethics committee of the Senate of Trier University has been obtained (EK Nr. 31-2021).

T8 Conflict of Interest Statement

Identify any real or perceived conflicts of interest with this study execution. For example, any interests or activities that might be seen as influencing the research (e.g., financial interests in a test or procedure, funding by pharmaceutical companies for research).

There are no conflicts of interest.

T9 Keywords

Include terms specific to your topic, methodology, and population. Use natural language and avoid words used in the title or overly general terms. If you need help with keywords, try a keyword search using your proposed keywords in a search engine to check results.

Data Documentation, Curation Standard, Psychological Research Data, Reusability

T10 Data accessibility statement and planned repository

"We plan to make the data available (yes / no)
If "yes", please specify the planned data availability level by selecting one of the options:

- Data access via download; usage of data for all purposes (public use file)
- Data access via download; usage of data restricted to scientific purposes (scientific use file)
- Data access via download; usage of data has to be agreed and defined on an individual case basis
- Data access via secure data center (no download, usage/analysis only in a secure data center)
- Data available upon email request by member of scientific community
- Other (please specify)

Yes, data access via download; usage of data for all purposes (public use file); data will be made available in PsychArchives

T11 Optional: Code availability

We plan to make the code available (yes / no).
If "yes", please specify the planned code availability level (use same descriptors of data in T10).

Yes, code access via download; usage of code for all purposes (public use file)

T12 Optional: Standard lab practices

Standard lab practices refer to a (timestamped) document, software package, or similar, which specifies standard pipelines, analytical decisions, etc. which always apply to certain types of research in a lab. Specify here and refer to at the appropriate positions in the remainder of the template:
We plan to make the standard lab practices available (yes / no).
If "yes", please specify the planned standard lab practices availability level (use same descriptors of data in T10).

Abstract

(150 words)

A1 Background

(See introduction I1)

In the course of the Open Science Movement and the replication crisis in psychology, as well as other disciplines, sharing research data openly has become increasingly important. However, a lack of concrete and easy-to-use standards for documenting research data in a reusable way avoids that data sharing becomes common practice in psychology. To counteract this problem, the BMBF-funded project PsyCuraDat aims at the development of a user-friendly curation standard enabling the data's long term interpretability and reusability (Blask, Gerhards, & Jalynskij, 2021).

A2 Objectives and Research questions

(See introduction I2)

The present study is targeted at providing an empirical test of the user-friendliness of the data documentation standard developed within the project PsyCuraDat.

A3 Participants

(See methods M4)

N = 52 master psychology students will be recruited via the panel administered by the department for study planning, data collection, and data analysis services at the Leibniz-Institute for Psychology

Additionally, the research assistants employed in the PsyCuraDat project (both are master psychology students) as well as three to four of their fellow students will participate in a pilot test.

A4 Study method

(See methods M10-14)

Participants will be randomly assigned to a 2 (use: documentation vs. reuse) x 2(standard: yes vs. no) between-subjects design.

Introduction

(no word limit)

I1 Theoretical background

Provide a brief overview that justifies the research hypotheses.

In the course of the Open Science Movement and the replication crisis in psychology, as well as other disciplines, sharing research data openly has become increasingly important. However, it turned out that only making data openly accessible is not enough in order to ensure their sustainable (re)use (Chen et al., 2019). Instead it needs a thorough description of the whole data collection process. Currently, this documentation process is perceived to be very time-consuming and lacks concrete and easy-to-use standards. To counteract this problem, the BMBF-funded project PsyCuraDat aims at developing a user-friendly curation standard, enabling the data's long term interpretability and reusability (Blask, Gerhards, & Jalynskij, 2021). Contrary to the development of previous standards in this field (e.g., BIDS, Gorgolewski et al., 2016), the present project aims at providing an empirical test of the user-friendliness of the standard.

I2 Objectives and Research question(s)

Outline objectives and research questions that inform the methodology and analyses (below).

The here presented user study aims at the evaluation of the efficiency and effectivity of the data documentation process, when using the standard developed within the PsyCuraDat project versus using no standard. Further, it pursues to assess the quality of the data documentation according to the PsyCuraDat standard versus no standard. Therefore, half of the participants are either asked to document existing data according to the PsyCuraDat standard or make use of their own documentation strategy. The other half will be given the task to reuse these data (i.e. the datasets prepared by other participants) and later assess the documentation quality of the dataset, as well as answering questions about the dataset.

I3 Hypothesis (H1, H2, …)

Provide hypothesis for predicted results. If multiple hypotheses, uniquely number them (e.g., H1, H2a, H2b,) and refer to them the same way at other points in the registration document and in the manuscript.

H1: Applying the PsyCuraDat standard on the documentation of research data, has a positive effect on the efficiency and effectivity of the data documentation process.

H2: Data which has been documented according to the PsyCuraDat standard, has a positive effect on the data's reusability.

I4 Exploratory research questions (if applicable; E1, E2, ...)

If planning exploratory analyses, provide rationale for them here. If multiple exploratory analyses, uniquely number them (E1, E2, ...) and refer to them in the same way in the registration document and in future publications.

We are planning to conduct an exploratory analysis on the relationship between the perceived quality of one's own data documentation and the actual reusability of the research data. This analysis is intended to shed more light on the correlation between researchers' self-assessment of the reuse potential of their data and the objectively measurable reuse potential of that data. Furthermore, depending on technical availability, we may record participants eye-movements for exploratory qualitative analysis and further refine the standard by learning about actual information processing during data curation and re-use.

Method

M1 Time point of registration

Select one of the options:

- Registration prior to creation of data
- Registration prior to any human observation of the data
- Registration prior to accessing the data
- Registration prior to analysis of the data
- Other (please specify; might include if T1 longitudinal data has been analyzed, but T2 has not yet been analyzed)

Registration prior to creation of data

M2 Proposal: Use of pre-existing data (re-analysis or secondary data analysis)

Will pre-existing data be used in the planned study? If yes, indicate if the data were previously published and specify the source of the data (e.g., DOI or APA style reference of original publication). Specify your level of knowledge of the data (e.g., descriptive statistics from previous publications), whether or not this is relevant for the hypotheses of the present study, and how it is assured that you are unaware of results or statistical patterns in the data of relevance to the present hypotheses.

not applicable

Sampling Procedure and Data Collection

M3 Sample size, power and precision

(1) Relevant sample sizes: e.g., single groups, multiple groups, and sample sizes (or sample ranges) found at each level of multilevel data. (2) Provide power analysis (e.g. power curves) for fixed-N designs. For sequential designs, indicate your ‘stopping rule’ such as the points at which you intend to be viewing your data and in any way analyzing them (e.g., t-tests and correlations, but even descriptively such as with histograms).

(1) Relevant sample sizes: 52 (26 participants in the documentation condition and 26 participants in the reuse condition, respectively)
(2) The sample size is calculated to detect differences among means with an alpha of $\alpha = .05$, a power of $1-\beta = .80$, and an expected large effect size of Cohen's $d = 0.8$, using the software G-Power (Faul, Erdfelder, Lang, & Buchner, 2007). Note, that we will oversample a bit to have the same number of subjects per condition.

M4 Participant recruitment, selection, and compensation

Indicate (a) methods of recruitment (e.g., subject pool advertisement, community events, crowdsourcing platforms, snowball sampling); (b) selection and inclusion/exclusion criteria (e.g., age, visual acuity, language facility); (c) details of any stratification sampling used; (d) planned participant characteristics (gender, race/ethnicity, sexual orientation and gender identity, SES, education level, age, disability or health status, geographic location); (e) compensation amount and method (e.g., same payment to all, pay based on performance, lottery).

a) For the pilot test participants will be the research assistants who are employed in the project and some of their friends.
   Participants in the main study will be recruited via the panel administered by the department for study planning, data collection, and data analysis services at the Leibniz-Institute for Psychology. Psychology students; exclusion criteria: students of other disciplines
b) not applicable because the present user study relies on a convenience sampling procedure
c) Master students in Psychology
d) 10€ per hour

M5 How will participant drop-out be handled?

Indicate any special treatment for participants who drop out (e.g., there is follow-up in a manner different from the main sample, last value carried forward) or whether participants are replaced.

In the event of an early termination, the planned sample size is supplemented by one additional person according to the dropped out condition.

M6 Masking of participants and researchers

Indicate all forms of masking and/or allocation concealment (e.g., administrators, data collectors, raters, confederates are unaware of the condition to which participants were assigned).

Data collectors are unaware of the condition to which participants were assigned.

M7 Data cleaning and screening

Indicate all steps related to data quality control, e.g., outlier treatment, identification of missing data, checks for normality, etc.

Statistical outliers in response accuracy and processing time will be checked via the inter-quartile range (IQR). Cases between 1.5 IQRs below the first quartile or above the third quartile will be omitted from analysis. Normality for data will be assessed via the Shapiro-Wilk test.

M8 How will missing data be handled?

Indicate any procedures that will be applied during the analysis to deal with missing data, such as (a) case deletions; (b) averaging across scale items (to handle missing items for some); (c) test of missingness (MAR, MCAR, MNAR assumptions; (d) imputation procedures (FIML vs. MI); (e) Intention to treat analysis and per protocol analysis (as appropriate).

(a) If cases (i.e. participants) contain missing data due to technical errors, these will be omitted from analyses (complete case analyses). However, cases including missing data that are due to incomplete task completion (e.g. no solution offered or a skipped documentation step) will be recoded and included in the analyses.

M9 Other information (optional)

For example, training of raters/participants or anything else not yet specified.

In order to test for the feasibility of the documentation condition we are going to conduct a pilot test with the two research assistants employed in the PsyCuraDat project as well as three to four of their fellow students.

Conditions and design

M10 Type of study and study design

Indicate the type of study (e.g., experimental, observational, crosssectional vs. longitudinal, single case, clinical trial) and planned study design (e.g., between vs. within subjects, factorial, repeated measures, etc.), number of factors and factor levels, etc..

experimental study, planned study design: 2 (use: documentation vs. reuse) x 2(standard: yes vs. no) between-subjects design; One peculiarity of the design is that the research data documentation generated in the documentation condition is used by participants in the reuse condition to solve the various tasks, similar to a yoked design.

M11 Randomization of participants and/or experimental materials

If applicable, describe how participants are assigned to conditions or treatments, how stimuli are assigned to conditions, and how presentation of tests, trials, etc. is randomized. Indicate the randomization technique and whether constraints were applied (pseudo-randomization). Indicate any type of balancing across participants (e.g., assignments of responses to hands, etc.).

Participants in the documentation condition are randomly assigned to one of the two documentation conditions (i.e. standard vs. own data preparation strategy). The re-use condition participants will be tested after testing in the documentation condition has concluded. Each of them will be randomly assigned one of the datasets prepared by the participants in the documentation condition.

M12 Measured variables, manipulated variables, covariates

This section shall be used to unambiguously clarify which variables are used to operationalize the hypotheses specified above (item I3). Please (a) list all measured variables, and (b) explicitly state the functional role of each variable (i.e., independent variable, dependent variable, covariate, mediator, moderator). It is important to (c) specify for each hypothesis how it is operationalized, i.e., which variables will be used to test the respective hypothesis and how the hypothesis will be operationally defined in terms of these variables. The description here shall be consistent with the statistical analysis plans specified under AP6 (below).

(a) use; standard; response accuracy (based on correct and complete metadata ascription in the documentation condition and correct and complete task completion in the reuse condition); processing time (for documentation steps vs. tasks); data documentation condition only: perceived ease of data documentation; perceived documentation quality ; future use of the documentation strategy; experience in data documentation, experience with documentation standards; documentation standards already used (only if participants indicated to have experience with documentation standards); data types already documented (only if participants indicated to have experience with documentation standards); reuse condition only: perceived ease of data reuse; improved comprehensibility ; comprehensibility_hypotheses; comprehensibility_operationalization; comprehensibility_manipulation; comprehensibility_analyses; experience in reusing data curated with a standard; documentation standards used for reused data (only if participants indicated to have reused data that have been curated in accordance with a standard); context data reuse (only if participants indicated to have reused data that have been curated in accordance with a standard); data types already reused (only if participants indicated to have reused data that have been curated in accordance with a standard); importance of standardized documentation; necessary criteria for a data curation standard; further remarks

(b) Dependent Variables: response accuracy (based on correct and complete metadata ascription in the documentation condition and correct and complete task completion in the reuse condition); processing time (for documentation steps vs. task completion) - Note, that in the documentation condition, processing time is determined manually from the screen recordings after the data collection has been completed, as there is no defined or prescribed start or end event for the various documentation steps (i.e., participants choose order of- and time on task). In the reuse condition, the recording of the processing time begins with the completion of reading the instructions and ends with the submission of the task solution.; Independent Variables: use; standard; Control Variables: perceived ease of

data documentation; perceived documentation quality ; future use of the documentation strategy; experience in data documentation, experience with documentation standards; documentation standards already used; data types already documented; reuse condition only: perceived ease of data reuse; improved comprehensibility ; comprehensibility_hypotheses; comprehensibility_operationalization; comprehensibility_manipulation; comprehensibility_analyses; experience in reusing data curated with a standard; documentation standards used for reused data; context data reuse; data types already reused; importance of standardized documentation; necessary criteria for a data curation standard; further remarks

(c) H1: Impact of the independent variable 'documentation standard' on response accuracy and processing time in the documentation condition; H2: Impact of the independent variable 'documentation standard' on response accuracy and processing time in the reuse condition.

M13 Study Materials

Please describe any relevant study materials. This could include, for example, stimulus materials used for experiments, questionnaires used for rating studies, training protocols for intervention studies, etc.

participant information; informed consent; list of questions asked within reuse condition; follow-up questionnaires for the conditions documentation and reuse; simulated data for the documentation condition; documentation instructions for the PsyCuraDat-standard; instructions and materials used within the demo study in the documentation condition

M14 Study Procedures

Please describe here any relevant information about how the study will be conducted, e.g., the number and timing of measurement time points for longitudinal research, the number of blocks or runs per session of an experiment, laboratory setting, the group size in group testing, the number of training sessions in interventional studies, questionnaire administration for online assessments, etc.

At the beginning of the user study, the subjects will be given information on the general procedure of the user study and their consent to participate in the study will be recorded. The planned user study will be implemented in the form of a 2 (use: documentation vs. reuse) x 2 (standard: yes vs. no) between-subjects design. The use factor distinguishes whether participants have to document data from a study they have gone through themselves (documentation) or reuse appropriately documented data from the same study to answer various questions (reuse).

The documentation condition is intended to address the usability of the standard from the perspective of researchers who want to make their data available for reuse. In order to create comparable prior knowledge among all participants regarding the data to be documented, all participants in this group undergo a replication of Anderson and colleagues' (2021) initial study of the anchor effect. Within this study, two hypotheses are apparently being investigated. On the one hand, it is to be examined to what extent the prices of certain products are estimated to be more expensive or cheaper depending on the level of the reference value presented for the product price. On the other hand, it will be examined whether organic labels - in the sense of a high anchor - lead to products with such a label being assessed as more expensive than products without a label. Furthermore, it will be investigated whether the participants assess the prices of products with an organic label differently depending on their environmental awareness. To test these hypotheses, a 2 (anchor: high vs. low) x 2 (organic label: yes vs. no) repeated measures design will be realized.

As mentioned at the outset, there is no actual evaluation of this study, as its purpose is merely to generate a comparable body of knowledge with reference to the data to be documented in this condition. Following this example study, included in the study design for demonstration purposes, participants are asked to document a provided data set (i.e., the simulated dataset mentioned under M13) that could have so emerged from the study previously run.

In the second condition, the so-called reuse condition, the user-friendliness of the standard is to be investigated from the perspective of those researchers who would like to re-use data - provided, for example, via a repository. For this purpose, the participants in this condition are asked different questions about the data documentation created in the documentation condition, for example, which hypotheses were investigated or which design was realized (for a complete list of questions, see corresponding material). Thus, the reuse condition is not collected until after the documentation condition has been completed. The assignment of data documentations resulting from the documentation condition to participants in the reuse condition is randomized.

The second factor, standard, varies the presence or absence of the documentation standard developed in the PsyCuraDat project. While participants in the standard condition receive short descriptions for each individual documentation step (see M13), participants in the no-standard condition are completely free to choose their documentation strategy and thus also the content to be documented. For the documentation, the participants in the standard condition are provided with the documentation tool DataWiz as well as common graphics programs to create an overview graphic of the data life cycle. In the self-selected documentation strategy condition, subjects have access to common text editing (e.g. MS-Word)/spreadsheet (e.g. MS-Excel) and graphics programs (e.g. MS-Powerpoint). All files created for data documentation (e.g., study documentation and codebook) are stored in a dedicated folder. The goal of this variation in documentation strategy is, on the one hand, to map differences in usability within the documentation condition (e.g., efficiency gains when using the standard) that are due to the use of a predefined standard versus a self-selected documentation strategy. Within the reuse condition, on the other hand, it is used to represent differences in the comprehensibility of psychological research data documented either using the PsyCuraDat standard or based on a self-selected documentation strategy. In order to gain additional insight into the results obtained from the analysis of the processing accuracy and duration there will be an exploratory analysis of participants mouse clicks/movements, their eye movements as well as their individual working style by means of a screen recording (screen recordings, eye-movements and mouse action will be gathered using the software Tobii Pro Lab). After completion of the documentation or reuse part, the participants fill out a short follow-up questionnaire in which they are asked about the perceived user-friendliness of the documentation and post-use situation (see follow-up questionnaires). There will be no debriefing of participants after completion of the study, because there is no deception of participants at any time.

M15 Other information (optional)

Analysis plan

(NOTE: If this varies by hypothesis, repeat analysis plan for each)

AP1 Criteria for post-data collection exclusion of participants, if any

Describe all criteria that will lead to the exclusion of a participant's data (e.g. performance criteria, non-responding in physiological measures, incomplete data). Be as specific as possible.

If a subject has not provided an answer for a particular task due to technical errors, he or she will be excluded from the analysis. Similarly, participants representing univariate outliers in response accuracy or processing time will be excluded from analysis.

AP2 Criteria for post-data collection exclusions on trial level (if applicable)

Describe all criteria that will lead to the exclusion of a trial or item (e.g. statistical outliers, response time criteria). Be as specific as possible.

not applicable

AP3 Data preprocessing

Describe all data manipulations that are performed in preparation of the main analyses, e.g. calculation of variables or scales, recoding, any data transformations, preprocessing steps for imaging or physiological data (or refer to publicly accessible standard lab procedure, cf. T12).

not applicable

AP4 Reliability analysis (if applicable)

Specify the type of scale reliability that will be estimated, whether it is internal consistency (e.g. Cronbach's alpha, omega), test-retest reliability, or some other form (e.g., a

confirmatory factor analysis incorporating multiple factors as sources of variance). In a study involving measure development, researchers should specify criteria for removing items from measures a priori (e.g., largest factor loading magnitude, smallest drop in alpha-if-item removed).

not applicable

AP5 Descriptive statistics

Specify which descriptive statistics will be calculated for which variables. If appropriate, specify which indices of effect size will be used. If descriptive statistics are linked to specific hypotheses, explicitly link the information given here to the respective hypothesis.

For the report of results in textual and graphical form, mean values and standard deviations are calculated for response accuracy, processing time, and all quantitatively collected control variables.

AP6 Statistical models (provide for each hypothesis if varies)

Specify the statistical model (e.g. t test, ANOVA, LMM) that will be used to test each of your hypotheses. Give all necessary information about model specification (e.g., variables, interactions, planned contrasts) and follow-up analyses. Include model selection criteria (e.g., fit indices), corrections for multiple testing, and tests for statistical violations, if applicable. Wherever unclear, describe how effect sizes will be calculated (e.g., for d-values, use the control SD or the pooled SD).

The two main hypotheses - i.e. the impact of the standard on the usability of the documentation and reuse process, respectively - will be tested via a one-way independent ANOVA on the factor standard. Analysis will be conducted in accordance with the frequentist as well as the Bayesian statistical model.

AP7 Inference criteria

Specify the criteria used for inferences (e.g., p values, Bayes factors, effect size measures) and the thresholds for accepting or rejecting your hypotheses. If possible, define a smallest effect size of interest. If inference criteria differ between hypotheses, specify separately for each hypothesis and respective statistical model by explicitly referring to the numbers of the hypotheses. Describe which effect size measures will be reported and how they are calculated.

Inference criteria will be p values, partial eta square and Bayes factors (B10 and B01 in order to be able to account for ambivalent findings also). Given that the present study is quite exploratory there is no smallest effect size of interest based on empirical data and therefore also no prior that could be defined for Bayes analyses. Therefore, we rely on the standard cauchy distribution. However, we would consider a Bayes factor B10 between 10 and 30, i.e. strong evidence in favor of H1, to be sufficiently high to accept our hypotheses.

AP8 Exploratory analysis (optional)

Describe any exploratory analyses to be conducted with your data. Include here any planned analyses that are not confirmatory in the sense of being a direct test of one of the specified hypotheses.

AP9 Other information (optional)

Other information optional

(NOTE: If needed, multiple lines with other information can be included)

O1 Other information (optional)
If there is any additional information that you feel needs to be included in your preregistration, please enter it here. Literature cited, disclosures of any related work such as replications or work that uses the same data, or other context that will be helpful for future readers would be appropriate here.

References

R1 References

Enter your references below. Use a consistent format (e.g., https://apastyle.apa.org/style-grammar-guidelines/references/examples)

References

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To receive a timestamp and a DOI (digital object identifier), submit your preregistration protocol to **PsychArchives** via https://pasa.psycharchives.org/, preferably as PDF.