Reproducibility Project: Psychology Researcher Guide

The Reproducibility Project: Psychology developed a protocol for replicators to follow. This protocol explained step by step what information researchers should report and how, and what action they needed to take to complete their replication. The purpose of this protocol was to ensure that every replication was of high quality and followed a standard format.

When the RP:P completed analyses, the Researcher Guide was made inactive. Below you can see the guide. As the RP:P is no longer collecting data, please do not use this as means to join the project. It can, however, be used as an example of the replication process. Links have been edited to bring you to files that represent the state of the RP:P at its completion of analyses.

Phase 1

Select a study for replication

1. View the list of available articles.
    - When choosing a study, consider that we ask you to duplicate the circumstances of the original study as closely as possible - including administrations in the laboratory versus online. However, in the interest of having as many high-powered replications as possible, and for the possibility of comparing success rates of lab versus web replications, we are allowing researchers to do secondary/web replications of studies originally performed in the laboratory but amenable to web administration. The role that secondary/web replications will play in the final report will depend on how many there are, evidence for their comparability to lab replications, and the extent to which they provide novel insight in addition to the primary replications. However, authorship is earned by conducting the replications and including them in the public reporting of all studies, even if it does not appear in the final report.

2. Decide if you need funding for your project or not. The Reproducibility Project is currently offering small grants.

3. When you select a study, email the project coordinators with the article title, your name and affiliation, and the name and affiliation of any co-authors. We will add a row for your project to the Researcher Progress and Results document for you to update upon completion of each study phase, and fill in the “Phase 1: Study Claimed” cell for you. We will also add you to the Dropbox folder of articles.

Phase 2
Confirm/complete article coding

1. If your article was coded by a volunteer prior to you claiming it for replication, the RPP team will let you know. They will put this information into the Researcher Progress and Results document for you.

2. If the RPP team tells you that your article was not coded prior to you claiming it, please proceed to code the study yourself. Visit the Pre Data Collection Survey to do this. Once you have completed this step, email the project coordinators and we will fill in the Researcher Progress and Results document for you. **Note that,** by default, the last study of each article is the target for replication. If it is not feasible or sensible to select the last study for replication, document the rationale for not selecting that study in your paper draft and then evaluate whether it is feasible to replicate the second-to-last study. If no studies are feasible to replicate by any OSC members, then the article will not be included for replication.

3. Using the coded information, calculate the result effect size and sample needed for 80/90/95% power; email the project coordinators with this information and the project coordinators will enter the information into columns Z-AC on the Researcher Progress and Results document for you. In your email, please also provide the original study's actual power. When this is complete, the coordinators will enter the date into "Phase 2: Article Coding Complete".

Phase 3
Design the replication

The primary goal of each replication is to do as fair a direct replication of the original study as possible. The steps in this phase are intended to maximize the comparability of the original and replication project, to explicitly identify a priori features that are not directly comparable, and to anticipate whether these have a published or intuitive basis for altering the likelihood replication. Finally, as with the rest of the Reproducibility Project, replication project archives will be transparent and publicly available via the Open Science Framework: you will post your materials, protocols, and your introduction/methods prior to data collection and make them public.

1. Select primary effect for replication (confirm that this is the same as what's coded in phase 2): A study may have many findings that could be replicated. For the Reproducibility Project, the target of replication is the key finding in the last study of your chosen article. Subsequent decisions about design,

materials, and power are informed by the selected key finding. For example, if a study included physiological measures but the key finding is behavioral, then administration of the physiological measures may be unnecessary for the replication study.

2. When you claimed the article for replication you should have been informed as to whether or not the RPP team had collected the study materials for you. **If they were already collected**, skip to step five below. **If not**, contact the original researchers to request materials. Request original study materials and any important information about the methodology that may not have appeared in the original article. You can find suggested email content here. Engage original authors as colleagues and make every effort to heed their advice, and document when you cannot.

3. An important component of reproducibility is the extent to which the materials, procedure, and analysis can be obtained or reconstructed. Consider how responsive the original researchers were, i.e. the extent to which the original materials, procedure, and analysis strategy was available in the original article or shared by the original authors. Options are: No response (emails/phone calls of all original authors went unanswered), unavailable (materials could not be located), decline (original authors declined to share materials), or complete (original materials obtained). Email the project coordinators with your decision they will update the Researcher Progress and Results document for you. Record any specific comments about the sharing of information that facilitates or disrupts the ability to conduct the replication study in the Methods section of the replication report.

4. Gather all relevant materials: Whether shared by the original authors or not, prepare the relevant materials and instrumentation to conduct the replication. Keep notes of where there was insufficient information to reconstruct precisely as in the original report (and include this information in your intro/methods).

5. Plan sample size: In Phase 2 you calculated the samples needed for 80, 90, and 95% power. This was recorded on the Researcher Progress and Results document. Plan to collect at least enough data for 80% power, but if it is feasible to reach for greater power, please do so.

6. Draft introduction of replication report (template): Each replication project will have a straightforward, no-frills report of the study and results. These reports will be publicly available as supplementary material for the aggregate report(s) of the project as a whole. To maximize project integrity, the intro and methods will be written and critiqued in advance of data collection and

registered via the Open Science Framework. Introductions can be just 1-2 paragraphs clarifying the main idea of the original study, the target finding for replication, and any other essential information. You do NOT have to write a literature review -- that is in the original publication. You can write both the introduction and the methods in past tense.

7. Draft methods of replication report (template): The methods section should be as complete as possible, mirroring the original materials and procedure as closely as possible; use the report templat to maximize consistency across reports. When you draft the methods:
    - Include a "Power Analysis" section.
    - Call "Participants" section "Planned Sample".
    - Define the data collection termination rule in the "Planned Sample" subsection. Later, after data collection, add a short addendum to the methods section in an "Actual Sample" subsection. Include notes about any changes to the planned method.
    - In "Analysis Plan", describe the details of data exclusion, cleaning, covariates, and the inferential test as completely as possible. The goal is to use an analysis plan that is as close to the original one as possible.
    - In the "Differences from original study" section, explicitly describe known differences in sample, setting, procedure, and analysis plan from original study. The goal, of course, is to minimize those differences, but differences will inevitably occur. Note whether such differences are anticipated to make a difference based on claims in the original article or subsequent published research on the conditions for obtaining the effect.
8. Email the project coordinators and ask the project coordinators to fill in the date in the "Design" cell on the Researcher Progress and Results document.

Phase 4
Finalize implementation plan

Prepare the study for data collection and ensure that every effort was made to maximize the chances for replicating the original result.

1. Obtain IRB approval.

2. Finalize any remaining implementation details so that you can begin data collection on completion of this phase.

3. Share the methods draft with the original authors for comments and suggested edits. The goal is to maximize consistency with original research, clarify original authors' approval or reasons for skepticism of replication before conducting the replication (this will be used as a covariate testing for replication success). Contact the original author, using the second template here; even if the original authors did not respond in the earlier phase, make contact to give them an opportunity to respond at this stage. Share the methods and any other materials that could help them evaluate the suitability of the replication attempt. For example, if the procedure requires some stagecraft, you could post a clip on youtube of the simulated procedure to obtain original authors' comments.

4. Code original authors' assessment of intro/methods: Assess whether the original authors had concerns and, if so, whether they are linked to published claims/constraints on the effect or are unpublished thoughts about why the effect will not recur in the replication:
   1=endorsement of the design as a fair replication attempt
   2=concerns based on informed judgment/speculation
   3=concerns based on unpublished empirical evidence of the constraints on the effect
   4=concerns based on published empirical evidence of the constraints on the effect
   9=no response
   Email the project coordinators with your decision and they will enter it into the Researcher Progress and Results document for you.
   In the methods of your draft report, add a narrative summary of the original authors' comments, if any, to the methods section in the "Differences from original study" subsection. If you are able to resolve the concerns, then eliminate them from the methods text and coding (i.e., ideally, the original authors would ultimately endorse all designs, but some will not be feasible to address all the concerns so they will need another code).

5. Ask the project coordinators to add the date of completion of this checklist to the "Finalize Implementation Plan" cell on the Researcher Progress and Results document.

Phase 5

Complete pre-launch checklist and public archive

These are the final tasks prior to initiating data collection.

1. OSC review: Share draft intro/methods with 1 or 2 other OSC researchers for review and comments. To do this, email the project coordinators and ask to be matched up with a reviewer for your intro/methods. You will quickly be put in touch with another researcher. The goal is to maximize consistency and shared knowledge across reports, and have a final "outsider" check on design details.

2. Finalize intro and methods: Complete any final revisions based on comments by original authors and OSC reviewers. If some design recommendations by the original authors were not followed, make them explicit and say why they were not followed in the "Differences from original study" section.

3. Post your finalized intro/methods and materials to the Open Science Framework (OSF)

    - Obtain OSF accounts for all team members. Members that do not yet have accounts can sign-up at the OSF website.

    - If the RPP coordinating team did not already send you a link to your replication's OSF project, create the project component for your replication project. Your project will be a "link" within the Reproducibility Project and will reflect the following design:

        - From your user dashboard, which will appear when you log in, click "New Project."

        - Title your project "Replication of [author names] ([year], [journal abbreviation], [study number]". For example: "Replication of Reynolds & Besner (2008, JEP:LMC, Study 5)"

        - Add a single sentence description of your replication.

        - In the template drop down, search for "RPP template" and select it. Then, click "Create New Project"

        - Add your co-authors by visiting the sharing page. A link to this is on the grey navigation bar in your project. Click "add new contributors" and search for your colleagues. If you search for someone who does not have an OSF account, you can add them as an unregistered user and send them an invitation automatically.

- Prepare your materials.
    - Use an easy-to-understand naming scheme for all posted files.
    - For materials you can't make available (for example, if they are copyrighted or not possible to digitize), prepare a brief written description of the materials. If you received materials from the original authors, it is wise to let them know that materials from the replication are being posted so that they can raise concerns if any.
    - If the study setting and procedure are important, consider filming a simulation of each experimental condition that matches the actual testing circumstances as closely as possible, and posting the video to youtube. If photos are sufficient, upload them as files in the step below.
- Upload your materials.
    - Click into your "Materials" component from your project. Then, click on "Files" in the grey navigation bar and upload all materials, including your intro/methods draft, by dragging and dropping.
    - Add a description to your materials component by clicking "Wiki" and then click the "edit" button on the right. Type or paste in your description and add any formatting. Include brief descriptions of any materials you can't make available. Make sure to click the save button before continuing
    - Make your project visible to the public. If you have not already, click the "public" button in the upper-right. Do this for your overall project (e.g. "Replication of Reynolds & Besner (2008, JEP:LMC, Study 5)") and each child component (e.g. "Materials"). Making a project or component public allows others to download and view all files posted to that component.
- Upload your pre-data collection report.
    - Once your pre-data collection report is ready, visit your project —not a component—and upload your report there.

- Once your project is complete, it should resemble this example project as closely as possible. You will have no files in your "Data" component yet, however.

4. As a final step, ask the project coordinators to visit the Researcher Progress and Results document and add the date of completion to the “Pre-Launch Checklist” cell.

Phase 6
Conduct data collection

1. Collect data until planned sample size or until termination rule is achieved.

2. Add termination information to methods section (if necessary): If a feasibility constraint limits data collection, discuss with the mailing list. If planned sample size or termination rule is not followed, document why in the methods addendum under “Differences from pre-data collection methods plan” (see the report template).

3. Ask the project coordinators to add the date of completion to the “Data Collection” cell on the Researcher Progress and Results document.

Phase 7
Complete data analysis

1. Prepare your dataset. Make sure that identifying information is removed so that the data is fully anonymized. Note: If the data cannot be anonymized, instead of posting the data, add a note describing whom to contact to access the data and note that the requestor must have human subjects approval to obtain the non-anonymized datafile.

2. Upload raw data, clean data, codebook, and analysis scripts (if possible) to your Data component, and add a description to the Data component's wiki (see example).

    - From the dataset component, click “Files” and add your files.

    - Add the description by clicking “Wiki” and then click the “edit” button on the right. Type or paste in your description, add formatting, then insert links by clicking the world icon. Make sure to click the save button before continuing.

3. Confirmatory analysis: Conduct analysis following the analysis plan. If you are familiar with it, we suggest that you conduct your analyses in R. Report results in the "confirmatory analysis" section in the results (see the report template).

4. Report result: Fill out the Post Data Collection Survey to report your findings. Once you have done so, or if you have any questions about your calculations, please email the project coordinators. The RPP team will, upon receiving your email, import your responses from the survey to the Researcher Progress and Results document.

5. Exploratory analysis: Conduct any desired follow-up analyses to test potential moderators, or changes to analysis strategy. Report these results in the "exploratory analyses" section in the results of your report. If the original authors have been interested in the replication attempt, share the results with them and, if possible, get their insights and ideas for exploratory analyses.

6. Ask the project coordinators to add the date of completion to the "Analysis" cell on the Researcher Progress and Results document.

Phase 8
Complete report

1. Draft discussion section (template): Open the discussion section with a paragraph summarizing the primary result from the confirmatory analysis and the assessment of whether it replicated, partially replicated, or failed to replicate the original result. Add open-ended commentary (if any) reflecting:

    - Insights from follow-up exploratory analysis

    - Assessment of the meaning of the replication; e.g., for a failure to replicate, are the differences between original and present study ones that definitely, plausibly, or are unlikely to have been moderators of the result?

    - Discussion of any objections or challenges raised by the original authors about the replication attempt. This should be a discussion of those concerns that were raised prior to data collection when the authors first saw the protocol. None of these need to be lengthy.

2. Internal review: Share the draft results and discussion with one or two other OSC researchers for review and comments to maximize consistency across

reports, and identify any problems or lack of clarity. To do this, email the project coordinators and you will be matched up with an OSC researcher for review.

3. Finalize report: Incorporate any suggestions and finalize your report. Review the template one final time and ensure that your report matches the suggested format.

4. Do final checks that all information on your project row in the Researcher Progress and Results document. Ensure that the entered data accurately reflects the replication attempt. Ask the project coordinators to update your study information if necessary and to add the date of completion to the "Complete Report" cell.

Phase 9
Upload your dataset and final report

The RP is an open project, meaning that all of our materials and data are publicly available for anyone to review. In this phase, you'll complete your archive on the Open Science Framework website and make it public. You will end up with a project component that follows this example as closely as possible.

1. Upload your final report (in pdf format) and add a summary of your study to the main project component (see example; make sure to click the "read more" link to see the full summary). Include links and descriptions of any videos/photos you have posted.

2. If it is not already, make your dataset component visible to the public. From your dataset component, click the "public" button in the upper-right.

3. Confirm that your project component and all its subcomponents are public. If you haven't already given the original authors an update, send them the link to your project with a thank you for their help. A template for this email is available here.

    - You might also wish to invite the original authors to provide a commentary on the replication. If they are interested, you can offer to upload their interpretation of the findings to your OSF project as a separate file.

4. If you have not already done so, fill out the Post Data Collection Survey and the Supplementary Variables Survey to report your findings. Once you have

done so, or if you have any questions, please email the project coordinators. The RPP team will, upon receiving your email, import your responses to the master data file. They will also confirm that you are listed as an author on the upcoming publication—please be sure to respond to any emails that ask you to confirm spelling or institutional information.

5. Double check with your Trello board that you have completed every necessary task. If you are unsure how to access your board, or what a Trello board *is*, email the project coordinators.

6. Ask the project coordinators to go to the Researcher Progress and Results document and enter today's date in the checklist cell "Post Report and Data File."