Planning for Analysis and Pre-registration Cut Compressed

(DESCRIPTION)
[00:00:00.00] A slide appears on the screen. Title, Pre-registration: What and Why. Text, Katie Corker, Grand Valley State University. October 24, 2019. O P R E Methods Meeting.

(SPEECH)
[00:00:15.59] KATIE CORKER: I'm happy to be here today to talk to you about the what and why of pre-registration. So, we'll start with the what.

(DESCRIPTION)
[00:00:21.61] Katie stands behind a podium with a sign on it reading, Holiday Inn, Capitol. The Holiday Inn logo, a capital H, is also on the sign. A US flag is behind Katie. She speaks into a microphone atop the podium. She reads from a slide presentation.

(SPEECH)
[00:00:42.05] What is pre-registration? Pre-registration is a commitment to study design and/or a data analysis plan and/or study hypotheses prior to commencing the study. So, seems simple enough. It's committing to a plan ahead of time.

[00:01:00.15] The reason that I'm emphasizing the and/or is one of the things that I want to emphasize about pre-registration is that there are many different features of a study or a research process that could be registered, and they're not all mandatory. So, one of the common misconceptions about pre-registration among academics is that if you're not doing confirmatory hypothesis testing, then pre-registration is not appropriate for you.

[00:01:27.77] But it turns out there are a lot of benefits to pre-registering study design, the data analysis plan, independent of whether or not the study has specific theoretically derived hypotheses.

[00:01:39.05] So, we're going to focus on those benefits.

(DESCRIPTION)
[00:01:41.30] Moves to the next slide. Title, Pre-registration. An orange circle on the left reads, Exploratory - flexible, data-dependent. A white circle on the right reads, Confirmatory - Constrained, a priori. A double-ended arrow sits between the circles, pointing at each of them. A white rectangle at the bottom of the screen provides two links. Text, See De Groot, 1956 - H T T P, semicolon, forward slash, forward slash, www dot e j wagen makers dot com forward slash in press forward slash de groot 1956 underscore T A dot pdf. Text, Van't Veer and Giner Sorolla, 2016 - H T T P, semicolon, forward slash, forward slash, P S Y A R X I V dot com forward slash 4 F R M S forward slash.

(SPEECH)
[00:02:44.76] So, pre-registration helps us to see the dividing line between more exploratory

research, which is flexible and has decisions that might be made dependent on the data, and more confirmatory research that has constraints applied and it makes decisions a priori, or ahead of time.

[00:03:02.72] So, I've linked a couple of resources down at the bottom for you to be able to look into this a little bit more, in terms of kind of the theory behind the practice. The de Groot paper from 1956 is one of the earlier papers on this topic. And it's always sort of interesting given the renewed interest in these practices now to note that these are not new ideas, right?

[00:03:25.13] There's nothing sort of revolutionary about scientists advocating for declaring details about the study prior to it being done. But, as we saw in Simine's talk, it is very important for the rigor of our conclusions that we do adhere to this process and that we know when a decision has been made relative to when the data were collected.

(DESCRIPTION)
[00:03:49.20] Moves to the next slide. Title, Key Features - Pre-registration. There are four green boxes on the screen. One reads, Time Stamped. Another reads, Read Only. Another reads, Before the study. And the last one reads, In a repository.

(SPEECH)
[00:04:08.28] So, some key features of pre-registration. It's time stamped so we know that it happens prior to the study's beginning. So, it's before the study. It's a read-only document. So, it means that you are not editing the pre-registration after the study has begun. And typically, we post it in some kind of repository. So, I'll give some examples of what those repositories might look like in a moment, but these are kind of the basic features.

(DESCRIPTION)
[00:04:35.35] Moves to the next slide. Title, Why Pre-register? Distinct Goals.

[00:04:41.21] There are three orange boxes on the slide. The first one reads, Constrain flexibility, avoid overfitting. The second one reads, Increase transparency, rigor. The third one reads, Falsify, test theories.

(SPEECH)
[00:04:57.01] So, moving on a little bit to the why. Why is it the case that we need to pre-register? There are several distinct goals that explain why we might want to engage in this practice. So, building on what Simine was talking about before, one of our main priorities for doing this practice is that we want to constrain researcher flexibility and avoid over-fitting to our data.

[00:05:21.74] So, if we make decisions about how we're going to analyze the data based on the data that we've collected, we run the risk of making our conclusions too specific to that particular sample or that particular study. So, by setting our decisions ahead of time, we can reduce the possibility of strategically using flexibility to do things like get a statistically significant result.

[00:05:46.85] Pre-registration can also increase transparency and rigor. And I gather that that is a really central and important value for folks in the government. Probably always, but, maybe especially now, there's been an enhanced focus on increasing the transparency of practices. And if we have transparency in our studies, that can help us to make the case that our conclusions are more sound, potentially.

[00:06:13.83] Finally, pre-registration can also help us to falsify and test theories. So, if you are working in that mode where you have a specific theoretically derived hypothesis, there's a chance with pre-registration to prove yourself wrong. If we don't set those conditions ahead of time for how we plan to do the study and how we plan to interpret the results in terms of how they come out, we lose that chance to falsify.

[00:06:39.43] It becomes impossible to falsify a particular conclusion because we can change the prediction. We can change the way that we analyze the data in such a way that almost any result would support our hypothesis. So, these goals would drive our practices. So, we're going to have different focuses on different features of pre-registration depending on which one of these goals that you have.

(DESCRIPTION)
[00:07:05.21] Moves to the next slide. Title, Decisional Flexibility at Every Stage.

[00:07:10.81] Three blue boxes are on the slide. The first one title Methods reads, Stopping rule. Power Planning. Unique Scoring. The second one titled Analysis reads, Subgroups. Outliers. Choice of Test. Data Cleaning. The third one titled Reporting Reads, Focus on P less than 0.05. Selective Omission. Outcome switching.

(SPEECH)
[00:07:37.53] Now, Simine noted there's a lot of flexibility that we can potentially constrain in our research. Or if we leave this flexibility unconstrained, we have the potential for making strategic decisions and over-fitting. So, in terms of the different steps of the research process -- I'm breaking it down here by methods of our studies, how we analyze our data, and then what we do when we ultimately report those results -- we have flexibility at each of these different stages.

[00:08:06.92] So, in terms of the methods, the stopping rule refers to the rule that we use to decide when we're going to stop data collection. So, that's an area where there can be flexibility. If we allow people to just continue collecting data until a particular conclusion is reached, then we run into problems particularly with null hypothesis significance testing.

[00:08:30.46] For the methods, there's also implications for power planning. So, how well-powered do we want our studies to be in terms of statistical power? That's something that should be decided ahead of time, but often is left flexible.

[00:08:48.26] Also, in terms of the methods, we have unique scoring. So, if you are creating a variable out of your data, say, by combining multiple questions together to form a total, or you are scraping data from different sources and then combining that to form some kind of data in

your analysis, you know that there's a lot of different choices about how you can do those combination processes.

[00:09:10.91] So, you might look at certain databases and not others, or you might include certain items and not others. Many, many, many possibilities here. And that's an area where flexibility can enter in or be controlled when we pre-register how we intend to score or aggregate our data. In terms of analysis, again, there are many possibilities here for flexibility.

[00:09:35.06] We can analyze certain subgroups and ignore others. We can split the data into subgroups or analyze it as a whole. We can exclude outliers strategically. We can choose different statistical tests. I'm sure there are many, many choices often in terms of the type of analysis that we might do. So do we want a multilevel model? Do we want a simple model? Do we want to analyze at the level of the group, the individual?

[00:10:00.38] Many possibilities here as well, and those different tests are sometimes going to point to the same conclusion, but sometimes not. So, by setting that expectation ahead of time, we can reduce flexibility in terms of strategically choosing a test.

[00:10:17.90] Finally, in terms of data cleaning-- this is another area where if you're getting data from a source and you have to curate or clean it for use in your own analysis, you know that there are many, many choices that go into how you ultimately gather that data. Finally, in terms of reporting, even if we're not omitting statistically nonsignificant results, we often see a focus on results that are statistically significant.

[00:10:44.85] So, there can be choices in terms of how we choose to report that emphasize the things that ultimately turned out to be significant, and de-emphasize the thing that turned out to be not significant, in a way that's inconsistent or doesn't agree with how we originally thought about the research question that we were testing. We can have selective omission, so leaving out results that are discongruent with other results.

[00:11:12.09] And we can have outcome switching, as Simine mentioned. So, if we collect two or three different dependent variables and we only emphasize the one that gives the most favorable or the most theory consistent result.

(DESCRIPTION)
[00:11:26.22] Moves to the next slide. Image on the left shows four stacks of books next to each other, each stack higher than the previous one. A toddler stands on the second stack, which is made up of three books.

[00:11:40.02] Text on the right of the slide reads, One step at a time. New habits need to form.

(SPEECH)
[00:11:46.55] So, this might sound overwhelming. There's a lot of different choices to make, a lot of different details to think about when you're considering your pre-registration plan.

[00:11:58.06] So, I do like to emphasize that we shouldn't feel like we have to make these changes all at once. And we could move more slowly and build on the practices that we already have to introduce new practices. So, we start out with something that sounds relatively simple. Make a plan and declare it ahead of time. And then it turns out that there are many, many possible ways to make that plan.

[00:12:24.48] But we shouldn't become overwhelmed because we can build on our existing good habits.

(DESCRIPTION)
[00:12:31.74] Moves to the next slide. Title, Options for Pre-registration. Three white boxes below are numbered 1, 2, and 3. The first one reads, An Internal non-public system.

[00:12:45.45] The second one reads, Simple Templates. As predicted dot org. The third one reads, Full-fledged registries.

(SPEECH)
[00:12:53.79] So, there are lots of different options for registries for actually doing a pre-registration. So, I'll highlight three major options. So, you could have just an internal or non-public system. Now, this depends on the type of work that you're doing.

[00:13:12.16] I imagine sometimes when I speak to people who are working in business or organizations, there's some sense of information being proprietary, or secret, or otherwise not shareable. And so I'd just like to emphasize that even if that's the case, you can still use a system for pre-registration within your own organization.

[00:13:35.15] So, for example, I've heard that a decent amount of OPRE work happens through contracts. So, you could have an internal system where you preregister with vendors or clients preregister research. It's reviewed internally by OPRE. And there's a process there, even if that process isn't happening in a public registry that everyone could access.

[00:14:01.36] In addition to internal or non-public systems, you could use a simple template. So, there's a website called AsPredicted.org that has nine simple questions for pre-registration. The attractive features of this system is that it's relatively simple. The unattractive features, for me, are that it is relatively non-public.

[00:14:23.50] So, registrations that are done on AsPredicted.org are not searchable in any way. They can only be disclosed via a link that the person who created the registration gives to someone else. So, as a kind of system-wide approach, it doesn't really work. Because, ultimately, we want to be able to see all of the studies that have been registered and what has happened with those studies, not just the studies that authors choose to reveal.

[00:14:50.97] There are also full-fledged registries, and I have a few examples of these listed here.

(DESCRIPTION)
[00:14:56.09] Moves to the next slide. Four registries are listed with their organization logos and websites. The first one reads, C O S, Center for Open Science. Open Science Framework. H T T P S, colon, forward slash, forward slash, C O S dot I O, forward slash, P R E R E G.

[00:15:20.35] The second registry listed is the American Economic Association. The logo has a torch in the center. Text, Economics. H T T P S, colon, forward slash, forward slash, W W W Dot, social science registry dot org.

[00:15:39.39] The third listed registry is E G A P, Evidence in Governance and Politics. A mandala-type logo is next to the organization name. Text, Poli Sci. H T T P forward slash, forward slash, Egap dot org forward slash content forward slash registration.

[00:16:00.52] The fourth registry listed is the World Health Organization, with a logo of a snake coiled around a staff. Text, Biomedicine, H T T P S, colon, forward slash, forward slash, www dot who dot I N T, forward slash I C T R P forward slash Network forward slash E N. A second U R L reads, H T T P S colon forward slash, forward slash clinical trials dot gov.

(SPEECH)
[00:16:32.68] So, the Center for Open Science has the Open Science Framework, which is a very robust and flexible system for pre-registration. There's also, within economics, the American Economic Association has its own registry. Likewise, in political science, there is an EGAP Registry. And a variety of registries within biomedicine, including ClinicalTrials.gov and the World Health Organization's repository.

[00:16:58.83] So, you might choose a full-fledged registry based on the topic or the domain of interest. If you are looking for the most domain general and broadly applicable registry, I would recommend the Open Science Framework.

(DESCRIPTION)
[00:17:14.29] Moves to new slide. Title, The Open Science Frame Work. The slide shows a clip of a web page from O S F Registries. Title, Pre-registered Replication of Study 3--Americans Overestimate Social-Class Mobility. The page describes the nature of the effect - a description of the effect they're trying to replicate, why it's important, and the size of the effect they're trying to replicate. It also provides registry information, such as the date registered, the date created, and the type.

(SPEECH)
[00:17:51.15] What I'm showing here is just a screen cap of what a registration looks like. You can't see it because of the contrast on the slide, but it would be ultimately marked read-only.

[00:18:03.03] So, this would be when someone had registered the study, the details would be there and findable within the system, but not editable by the original author. So, it includes some description of what's being registered, answers to questions in a particular form that has been filled out, links to files, and so on. So, it's a very robust system. I'm not going to talk in detail

today about how to use the system. But if there's some questions about how it works, that could be something we could talk about in the Q&A.

(DESCRIPTION)
[00:18:36.20] Moves to the next slide. Title, Tips for Successful Pre-Registration. There are six tips listed.. 1, Use a template. 2, Peer-review pre-study. 3, Plan for power. 4, Be specific. 5, Know how you'll draw a conclusion. 6, Peer-review post-study.

(SPEECH)
[00:18:58.50] So, instead, what I'm going to switch to is tips for doing a successful pre-registration. So, assume you have a project, you've selected a repository, you're ready to do the pre-registration. What can you do to be successful? Number one tip is use a template. So, a template would be a series of questions or features of a study to be pre-registered that you declare ahead of time.

[00:19:26.06] Using a template is useful because it increases standardization from study to study, so you can always review kind of your broader array of work consistently. And it's also the case that it's very easy to forget elements of these plans. Like I said, there are many possible details and many ways that you could constrain flexibility in your study, and it's extremely easy to just simply miss one, forget about one.

[00:19:53.18] So, using a template makes it less likely that that will happen and increases consistency from study to study. I have some examples on the next slide or some links, I should say, to where you can go to get templates because there are a variety of templates for different types of research designs and different disciplines and so on.

[00:20:12.04] My next tip is peer review pre-study. Now, you might see "peer review" and you might think about journal publications. But what I'm actually talking about here is just some kind of review of the plan prior to the study beginning. So, I'll talk in a moment about a type of journal article that has been spreading in popularity called register reports. Simine mentioned it briefly already, as well.

[00:20:39.22] In a registered report, a journal oversees the process of registration of a study. So, someone submits a protocol or proposal to the journal, that journal gets reviewed by peers and an editor, and the plan for the study can then be improved and made more specific through the process of that registration.

[00:21:01.76] So, even if you are not doing pre-registration in the context of a registered reports journal, it can still be really, really useful to get this kind of outside eye on the work. So, it could be a buddy system where one team prepares a registration, another team reviews it. It could be, again, something that the client prepares a registration and the program officer or project manager reviews it.

[00:21:28.89] But the idea is that someone who's not directly involved with the study gets some eyes on the plan. Again, this can help improve the quality of it and it can help make sure that

certain details aren't missed. Third step is to plan for power. So, statistical power is extremely important to make sure that your study is likely to be informative, regardless of the outcome.

[00:21:57.36] So, we know that if you do an underpowered study, you might get a result that's ambiguous or not as informative as you like. So, planning for power is a really, really key step in the pre-registration process. We want to be specific. If a study is pre-registered but it's done in a vague way, perhaps there's some merit to having that preregistration, but it's almost the vaguer that it gets, you might as well have not done that step at all.

[00:22:26.59] So, if the goal of a pre-registration is to constrain that additional flexibility, but the actual document itself doesn't do that -- it doesn't constrain what researchers do -- then it will have limited value. Likewise, you should know how you'll draw a conclusion. So, if you plan your study, you should know no matter how the results come out, this study is going to be informative in some way.

[00:22:54.55] So, the results turn out null, that's what this means for the conclusion that we draw. The results turn out significant, that's what this means. This contrast turns out this way. So, thinking through those decision trees ahead of time to make sure that there are not outcomes that are possible that are in some way uninformative.

[00:23:13.69] Also, one way that I've seen this done is you can actually prepare the final report that you're going to write. So, whether it be the reporter, journal article, or whatever. And it can be prepared without the results included, but with sort of contingencies. So, if this is statistically significant, then we have this passage, which shows how we interpret the result.

[00:23:39.67] If it's not statistically significant, here's this other passage that shows. I've gone through this process myself. It's very challenging. It's really challenging to sort of think through all of the details of how a study will work out before you've done it. OK, so my last tip is to have peer review post study.

[00:24:00.62] So, again, just like having eyes on the pre-registration before the study begins can be useful, it's useful to have them again at the end. And specifically, this can be useful for checking adherence to the plan. Now, of course we don't always adhere to every detail of the plans that we make in our pre-registrations, and that's totally fine.

[00:24:22.34] The important thing is that those deviations do get disclosed transparently in the final report. So, it can be easy for that kind of information to get omitted, even unintentionally, or to be kind of obscured or buried. So, the function of that secondary outside review of a registration is to make sure that the tests that were planned in the registration have actually been done, that deviations from the plan are disclosed.

(DESCRIPTION)
[00:24:51.43] Moves to the next slide. Title, Tools for Pre-registration.. Text, Power Analysis. Power package in R. H T T P S colon, forward slash, forward slash, cran dot R dash project dot org, forward slash, web, forward slash, packages, forward slash P W R, forward slash, vignettes, forward slash P W R dash vignette dot html. Text, Power simulation. Lane and Hennes, 2018. H

T T P S colon, forward slash, forward slash, D O I dot org, forward slash, 10 dot 1177, forward slash zero 2 6 5 4 zero 7 5 1 7 7 1 zero 3 4 2.

(SPEECH)
[00:25:43.11] OK. So as I said, there's some links in the slides, which are up on the OPRE website for this workshop. So, we have links to lots of different templates for different domains and different study designs. And also some links to resources for power analysis.

(DESCRIPTION)
[00:26:04.31] Moves to a new slide. Title, Basic Pre-registration Questions. 10 questions are listed on the slide. 1: Main research question. 2: Key variables and their measurement. 3: Hypotheses. 4: Conditions and randomization. 5: Sample size and stopping rule. 6: Study inclusion criteria. 7. Data exclusion criteria. 8: Positive controls. 9: Analysis plan (code?). 10. Provisions for existing data. URL reads, H T T P S colon forward slash, forward slash, O S F dot I O, forward slash, 93 Z N H.

(SPEECH)
[00:26:52.95] So, here are some of the basic questions that might be asked in a template. This is kind of like a slimmed down version of what would be provided in one of these templates. So, when you're doing a pre-registration, you would outline the main research question. You would specify what your key variables are and how they're measured. You would give hypotheses if you have them.

[00:27:12.16] Again, not everybody has specific hypotheses derived from theories. They may just have research questions or something that doesn't involve a specific directional prediction. Conditions in randomization, again, if appropriate -- not all studies are randomized experiments, so that might not be appropriate.

[00:27:30.17] Sample size and your stopping rule. So, how you'll decide how many people to collect or how many data points to collect and when to stop collecting data. What features qualify you to be in the study -- so, inclusion criteria -- and then what features would cause you to be removed from the analysis.

[00:27:47.76] So, if we're going to remove data points for being outliers, what are the conditions that would necessitate that ahead of time? I have highlighted one here -- positive controls -- because this is -- depending on your area of training, this might be familiar to you or less familiar, and it might have gone under different names.

[00:28:14.75] But, positive controls basically mean that we have some kind of outcome-neutral test that helps you to verify the validity of your manipulation or measurement.

(DESCRIPTION)
[00:28:23.93] Moves to slide titled, Positive Controls. Text reads, Outcome Neutral Tests. Verify validity of manipulation or measurement. NOT the study's main outcome.

(SPEECH)
[00:28:37.02] So, kind of in the spirit of making sure that your study is informative, regardless of how the results turn out, you want to be certain that the manipulation that you've introduced or the variables that you're measuring have been measured or manipulated in a valid way.

[00:28:54.16] So, for example, if it was a drug trial, right, we would want to know about drug adherence, right? Did people actually do the treatment that they're assigned to? I have another non-human subjects example from the Galileo Spacecraft. So, the Galileo Spacecraft did a bunch of things, but, among other things, it had sensors to detect life.

[00:29:15.36] And the very first thing that they did with the spacecraft as they put it up and they tested it to see if it could detect life on Earth. Because, if it doesn't detect life on Earth, it's not going to detect life anywhere else. So, you want those -- again, these are positive controls -- they are features of the study that help you make sure that your result is going to be informative no matter.

[00:29:34.88] We wouldn't want it to be the case that we'd say, 'Oh, we got a null result. That's because there's no life on Earth, right?' It's because the measurement failed. So, it's not the study's main outcome. So, in addition to those positive controls, you can provide an analysis plan, and, if you want to be very thorough and rigorous, you can provide code.

[00:29:53.52] So, you can simulate data that will match the structure of the data that you're ultimately going to have in your study. And then your code will be sort of ready to go to run on the data once it comes in. If you have existing data, so you're gathering data from a repository, there's going to be additional questions and details that you have to specify for that.

(DESCRIPTION)
[00:30:14.72] Moves to the next slide. Title, Ambiguous Pre-registration Case. Text in one box on the left, We expect to collect data from 100 subjects. Title in a second box on the right, Ambiguities. Text, Before or after exclusions? Individually or in groups? What happens if you can't get 100?

(SPEECH)
[00:30:38.33] So, one of the things I've said is that we want to make sure that these plans are specific and not vague. And, in doing so, we want to make sure that our critical study details are constrained. So, for example, we could register that we plan to collect data from 100 subjects, but we wouldn't necessarily know if that's before or after the exclusions have been applied.

[00:31:01.63] Is that people have measured individually or in groups? What happens if we don't hit our target? There's still a lot of unconstrained flexibility in that one sentence, all right? So, each part of the plan needs to get scrutinized to make sure that it's specific. And these are the kinds of things that you confront immediately when it comes time to analyze the data. But, what we're trying to do is shift that confrontation to the front part of the research process rather than the back end.

(DESCRIPTION)
[00:31:29.12] Moves to the next slide. Title, Ambiguous Pre-registration Case. Text in one box on the left, A two-by-three mixed ANOVA will be the designated statistical analysis. Title in a second box on the right. Ambiguities. Which planned comparison tests the hypothesis? Any assumption checks before analysis? Any follow up tests/contrasts?

(SPEECH)
[00:31:55.67] OK, just one more example. You could say I'm going to do a two-by-three mixed ANOVA. That's my planned analysis. But, hidden within that, which planned comparison in the two-by-three is the one that tests the focal hypothesis? Are there assumption checks? Do we need to do follow-up tests or contrasts? Still many more decisions to make, even if we've made a pretty tight specification for the type of analysis that we're doing.

(DESCRIPTION)
[00:32:21.95] Moves to the next slide. An image at the top of the slide shows a road sign reading, Benefits.

[00:32:28.58] An upward-pointing arrow is next to the words "transparency" and "rigor," or "quality." A downward-pointing arrow is next to the text, "Q R Ps," or "overfitting."

(SPEECH)
[00:32:41.35] So, the benefits of this practice. It can increase transparency and potentially rigor quality, if it's adhered to well, and that can decrease our focus on questionable research practices and over-fitting.

(DESCRIPTION)
[00:32:54.08] Moves to the next slide. Title, Eight Myths about Pre-registration. Text. 1, Stifles creativity. 2, Mandates guarantee quality. 3, Mostly addresses p-hacking. 4, Solves p-hacking. 5, not suitable for exploration. 6, Doesn't work for all areas. 7, Solves file drawer problem. 8, It's easy!

(SPEECH)
[00:33:22.38] So, although there are many benefits to the process, there are also a lot of myths about the process. And I'm going to spin through these relatively quickly, I'm going to attempt to.

[00:33:35.03] So, one myth is that it stifles creativity. So if you can't explore and play with the data, then that is somehow going to interfere with the process by which you analyze the data.

(DESCRIPTION)
[00:33:49.29] Moves to the Pre-Registration slide shown earlier with one circle titled Exploratory and one circle titled Confirmatory.

(SPEECH)
[00:33:57.88] All that pre-registration really does is spell out the line between what's exploratory and what's confirmatory. It doesn't prohibit exploratory testing. It doesn't prohibit deviating from the plan. All it asks for is for people to be clear about when they've done one or the other.

(DESCRIPTION)
[00:34:13.34] Moves back to the slide showing the eight myths about pre-registration. The second myth is highlighted. Mandates guarantee quality.

(SPEECH)
[00:34:22.71] Another myth is that if we just simply mandate this as a practice, that we'll have a guaranteed increase in quality. And, of course, that's not the case. There are many ways to do the practice well and many ways that wouldn't achieve the goals that we have with pre-registration.

(DESCRIPTION)
[00:34:39.18] Moves to a slide showing an image of a man squinting while looking at a computer screen. Text, Mandates incentivize. Mandates signal.

(SPEECH)
[00:34:49.43] What a mandate will do is it will incentivize. So, people will try to comply with the mandate.

[00:34:54.31] And it also signals. So, it signals the values of the organization or the party that is requesting you to do this practice, but it's not going to guarantee quality on its own. The individual people who actually engaging in it have to take steps to make sure that it's a rigorous process.

(DESCRIPTION)
[00:35:11.51] Moves back to the slide showing the eight myths about pre-registration. The third myth is highlighted. Mostly addresses p-hacking.

(SPEECH)
[00:35:20.97] One myth is that it mostly addresses p-hacking.

(DESCRIPTION)
[00:35:23.62] Moves to a slide titled, Not just about p-hacking. Text, Specifying design and analysis plan ahead of time prevents data-dependent decisions later. If hypotheses are specified a priori, also have a chance to falsify. If thorough, also a chance to improve your design, catch problems early.

(SPEECH)
[00:35:46.64] But, actually, there are many other things that it can address. So, it could be just about increasing transparency of the research process. It could be about increasing the quality of those processes. So again, if you have peer review ahead of time, there's a chance for someone to catch an error or a suboptimal design feature that otherwise wouldn't have been caught until after the study was done.

[00:36:11.14] If you are doing hypothesis testing research, you have a chance to falsify those hypotheses. Another myth is that it solves p-hacking, which we

(DESCRIPTION)
[00:36:20.79] Moves back to the slide showing the eight myths, then moves to the fourth myth. Solves p-hacking and then moves to a slide titled, Doesn't always solve p-hacking. Text, Pre-registration prevents 1, p-hacking. 2, data-dependent decisions, only to the extent that the pre-registration constrains later flexibility.

(SPEECH)
[00:36:44.74] should see that it wouldn't necessarily solve p-hacking unless our pre-reregistration constrains later flexibility. So, if we don't make the pre-registration specific, we will have problems doing a quality process.

(DESCRIPTION)
[00:37:06.34] Moves back to the slide showing the eight myths. The fifth myth is highlighted. Not suitable for exploration.

(SPEECH)
[00:37:13.91] So, again, that's not suitable for exploration.

(DESCRIPTION)
[00:37:16.70] Moves to a slide stating, theory-derived hypotheses are not required for pre-registration.

(SPEECH)
[00:37:23.33] We don't have to have theory-derived hypotheses to do this process. There's

(DESCRIPTION)
[00:37:27.02] Moves to a new slide titled, Things you can pre-register. Terms appear in seven ovals across the slide.

[00:37:34.96] From left to right, the ovals read, Design, Competing Hypotheses, Data Analysis Plan, Contingencies, Absence of Hypotheses, A Series of Studies, Knowledge of Dataset

(SPEECH)
[00:37:47.98] lots of different things we could pre-register. So, we could pre-register that we don't have hypotheses, that we're going to use a contingency. So, if this, then, that. A series of studies, knowledge of a data set, many different features could be declared ahead of time that are currently usually not disclosed.

[00:38:08.25] Is pre-registration only for simple experiments? No, it's not. There's large areas of social science that analyze secondary data sets or qual-- what do I want to call that? Not quantitative. Qualitative. There we go! Qualitative data.

(DESCRIPTION)
[00:38:23.08] Moves back to the slide showing the eight myths. The sixth myth is highlighted. Doesn't Work For All Areas. Then moves to the next slide, which asks, Pre-registration for everyone? Yes! Text, Practices will look different in different communities. Some fields analyze

large secondary data sets. See Weston et al in press, or template. open research notebooks: alternative technique; focus on transparency

(SPEECH)
[00:38:56.13] And these practices are going to look in those different communities.

[00:39:00.60] But, there are alternative techniques, such as open research notebooks, that could achieve some of the same goals as pre-registration with practices that fit that type of research. A couple more myths. That it solves the file drawer problem.

(DESCRIPTION)
[00:39:19.29] Moves back to the slide showing the eight myths. The seventh myth is highlighted. Solves file drawer problem. Briefly shows a slide titled Key Terms and Concepts. Three bullets read pre-registration vs. registered reports. Registration vs. pre-registration. Clinical trials DOT gov.

(SPEECH)
[00:39:40.99] Again, we're only going to be solving the file drawer problem if the pre-registrations that we do are public and findable.

(DESCRIPTION)
[00:39:49.05] Moves to a new slide titled, Study Registries versus Pre-reg. Text, Study registries track the existence of studies. If all studies are registered, and all results are reported, file drawer problem is resolved. Pre-reg needs to be public and findable to solve file drawer.

(SPEECH)
[00:40:10.41] So, we can have a study registry like ClinicalTrials.gov. And if all studies are registered and all results are reported, then we're good. Then we have solved the file drawer problem. But it's often the case that people don't report the results of their studies in ClinicalTrials.gov. Not all studies are registered, so we only have things like NIH and NSF funding to mandate registration. So, there's a lot of gaps still.

(DESCRIPTION)
[00:40:35.53] Moves to the next slide, titled, Registered Reports. A diagram shows the order of a Registered report. A right-pointing arrow sectioned into five stages shows the stages. The first section reads, Develop Idea. The second reads, Design Study. The third says, Collect and analyze data. The fourth reads, Write Report. And the last one reads, Publish report.

[00:41:03.20] An arrow points between stages 2 and 3 and reads, Stage 1, Peer Review. Another arrow points between stages 4 and 5 and reads, stage 2, peer review. Text, Over 200 participating journals! H T T P S colon, forward slash, forward slash, C O S dot I O forward slash, R R

(SPEECH)
[00:41:28.69] The registered reports process is one way that we can work on this file drawer problem because one of the things that makes registered reports unique is that journals agree to publish the data regardless of whether results are statistically significant or not. And you all as

government researchers have an opportunity to do this, too, where all results are reported, and not just a selected subset.

(DESCRIPTION)
[00:41:49.46] Moves back to the slide showing the eight myths. The eighth myth is highlighted. It's easy!

(SPEECH)
[00:41:55.75] The final myth, that it's easy. Again, it sounds really simple but I think it's actually very, very challenging to do this well. And it's something that the community has to work on together to develop practices that work within specific areas.

(DESCRIPTION)
[00:42:09.62] Moves to a slide reading, Anyone can pre-register, but doing it well is challenging.

[00:42:15.51] Moves to another slide showing a news clipping. The top reads, Volume 38, issue 21. American's finest New Source. Title, National Science Foundation-- Science Hard. Text, Indianapolis, The National Science Foundation's Annual symposium concluded Monday with the 1,500 scientists in attendance reaching the consensus that science is hard. Quote "For centuries, we have embraced the pursuit of scientific knowledge as one of the noblest and worthiest of human endeavors, one leading to the enrichment of mankind, both today and for future generations, said Keynote speaker and NSF chairman Louis Farian.

[00:43:00.58] Quote, However, a breakthrough discovery is challenging our long-held perceptions about our discipline-- the discovery that science is really, really hard. My area of expertise is the totally impossible science of particle physics," Farian continued. See Science Page 10. Farian Explains the NSF findings.

(SPEECH)
[00:43:23.51] So, a punchline of my talk is science is hard. Pre-registration is hard.

(DESCRIPTION)
[00:43:28.23] Moves back to the slide showing the eight myths.

(SPEECH)
[00:43:31.14] But if it was easy, it wouldn't be fun.

(DESCRIPTION)
[00:43:32.87] Moves to the next slide. Title, Thank you! Slide shows logos for the Society for the Improvement of Psychological Science, the Center for Open Science. Text, Slides H T T P colon, forward slash, forward slash O S F dot I O forward slash P 8 2 t u forward slash. Text, Email, k dot corker at gmail dot com. Text, Center for Open Science. H T T P S colon, forward slash, forward slash C O S dot I O. H T T P S colon, O S F dot I O. H T T P S colon, forward slash, forward slash www dot P S Y A R X I V dot org.

(SPEECH)
[00:44:21.45] So, that's all I've got. Thanks.

(DESCRIPTION)
[00:44:24.10] Last slide shows a box opening and office items coming out. Text, Methods for Promoting Open Science in Social-Policy Research. October 24, 2019. O P R E Methods Meeting.