Hi everyone and welcome to the final video in the thing before you do section of this lecture series. This video will focus on registered reports, which is a relatively new method of publishing in a reproducible manner. And this video will take you through the steps from preparation of a registered report right through to publication. Again, my contact details are there if you'd like to reach out and ask any questions about the content covered in this video. I'd also like to highlight that the slides that I'm going to cover in today's video, we're adapted from a workshop that I call delivered with Dr. Kelly wolf at the Edinburgh open research conference in May 2022. Okay, so to start off, what is a registered report? Well, in many ways, the elements of registered reports are similar to both the pre-registration and a standard journal article or an article on empirical research. So we have the development of an idea to each of the study design. There's then the collection or analysis of data, the writing of the report, and the publishing of a report. However, in a registered report, the peer review is split into two stages. The first happening after the first two steps, so after the development of the idea and the study design. And the second Then happening after the data has been analysed and the results of this study interpreted. This is the second stage of peer review and a registered report. To use the definition provided by the Centre for Open Science is a publishing format that emphasises the importance of the research question and the quality of the methodology. Conducting peer review prior to data collection or analysis. So your steady undergoes peer review before you know what your results are. And this is a way to try and eliminate questionable research practises like the selection of positive or significant findings and publication bias. So the advantage of this other registered reports is that even if your hypotheses aren't supported, the and you have followed your plan, mutation analysis plan, as you said you would, the findings of your results or the findings of your study will be published. So today I'm going to walk through each element of registered reports. Hopefully convince you that registered reports is a worthwhile research endeavour and can really be a fantastic way to, to embrace open research. Okay, so why should you do on firstly, it expands the x, the colour team of experts that are providing input on your research study. So e.g. if you're a PhD student, it expands your supervision team so that you get expert feedback on your project during the peer review of the first stage, one of your registered reports. So this is your introduction, your methods on your data analysis plan before you do any analysis. So I did a registered report as part of my PhD and I worked on a on a topic. So puberty that I'd never worked on before and my supervision team didn't have expertise in this area. So getting expert feedback from peer reviews was really, really helpful and it was a great sanity check for me to double-check that what I was doing was, was a robust approach. So it really does expand the number of experts and the input on the project. Also, it's a guaranteed publication, even though this shouldn't be the only motivating factor. Unfortunately, this publications are still a prominent currency in the world of academia. And having a registered report. And an in principle, acceptance is a way of guaranteeing a few future publication. So if you get your in principle acceptance after stage one. So this is after your first peer review, the first round of peer review. Then this means that you can put it on your CV and you can showcase that you have to kind of evidence that you are embracing open research practises. And this is something that a lot of universities and hiring committees are replacing further emphasis on at the moment. And also it's a better timeline for PhD students. So even though pre-registration and registered reports are quite front-loaded work activities, it really facilitates training and skill acquisition. So it would be a great thing to do at the start of a PhD. Not exclusively like it. You can do it in other adult their career stages as well. But particularly for PhD students, it provides a really nice opportunity to take a deep dive into your, into your project and to really engage with your research on a deeper level and to understand why are

you analysing your data in this specific way. And for me, personally, it was a really Fruitful learning experience and then allow me to really understand why I was making certain decisions in the lifecycle of my research study. And then this was very helpful if when I was writing my thesis at the end of my PhD. And as I mentioned, open research practises are increasingly being considered and emphasised by hiring committees in Europe and beyond. And I've seen many job advert saying that they would like to see evidence of a track record in open science. So this is very much the direction that science is heading in and embracing registered reports. And this way of working now is going to be an advantage later on. No doubt. Okay, So I also just want to give it a disclaimer before I get into further detail on a registered reports. This is based on my experience of doing a registered reports. So I used a secondary It was a secondary registered reports. So I was analysing pre-exist a pre-existing dataset. And the while a lot of the topics would be the same if you are collecting your own data. I just want to highlight that this is based on my experience. But I also want to highlight that embracing open research isn't an all or nothing approach. And you may not have the time to do a registered report in your PhD or at your current research stage. But again, a lot of the topics that we'll cover in today's lecture. Can I just good research practises to generally apply to your research and pre-registering your study is a good first step. So again, just if you can't do a registered report for for whatever reason, I just want to encourage you that as an all or nothing approach. Okay. So as I mentioned, a registered report is split into two sections. The first, stage one, and this involves the development of your idea. Literature review, the design of your methods, your data analysis plan. Then you submit this for stage one review. And the stage one review is very similar to a standard peer review, but it just happens before you, before you have your results and you haven't yet interpreted what you found. So I'm just gonna kinda walk through each of these elements. Okay, So the key ingredients are elements of stage one are very similar to any research study. But I suppose the difference of a registered reports is that you would maybe provide more detailed than you normally would in a standard manuscript. In your introduction, you'll have your aims and hypotheses. In your methods. You'll have the sample characteristics, your variables of interest, covariates, what preprocessing steps you're going to use on your data analysis plan. And this will include things like your statistical tests, how you're handling your data. So in my case, I had access to a big, large pre-existing dataset, but I also had to, but I hadn't analyse any of I hadn't done any of the analysis that I outlined in my data analysis plan. So often you need to provide a kind of self certification of what axis you've heard to the data. Sometimes you will, you will need some access to the data. And to kind of get an idea of how much, how many participants you have, what kind of power analysis you might need to do. I suppose if you're catching your own data, this might be kind of a bit different. So how are you going to handle the data that you collect and quartered of protocols would be in place so that you can show that you haven't analysed any of the data prior to your stage one submission. Another thing that's quite different, I suppose, about a registered report that you'll need to consider things like your outcome neutral criteria. So this could be things like floor or ceiling effects. And a lot of information. There's lots of information online that can help you delve into these registered registered reports specific criteria a bit more. I found that in my experience of a registered report, these very, very much depending on what your research question was. So I would encourage you to use the resources online if you had specific questions about certain aspects. And also, in my experience, I found that the reviewers, sorry, the editors of the journals, were really helpful. And often the registered, the journal that I submitted my red shirt report had a fantastic guideline for authors. Document that was really helpful and kinda prevented a stage, a stage one desk rejection because often a lot of papers

get rejected because you just haven't provided enough information that's required at the first stage of peer review. Again, an inference criteria. So how are you going to decide whether or not your hypotheses that have been supported, what sort of evidence are you using? Again, this is all quite similar to the information that you'd include in a pre-registration and something that kinda touched on in the previous video on a worked example of a pre-registration. But I suppose and erase your report, you're just going into a bit more detail. Again, you might want to include pilot data analysis and results to maybe inform your research questions. And two, if you wanted to do this, this will very much depend on the nature of your research project. In my case, I did do apply this analysis to inform my hypotheses because again, as I mentioned, it's really important that your hypotheses are concise and testable and specific. Often this can be quite hard if there's their inconclusive findings in the literature. So again, you can use pilot data to inform your hypothesis or to test out some models. And before you run your meta-analysis, again, as I mentioned, your data access statements. So just often you can provide a self certification or what sort of access you've had. But again, this is just some information that is quite specific to a registered report and something that you might want to consider. And again, acknowledgements and a credit statements. So just listing the contributions of each author. This is again, best practise and something that you should include in all your papers, but it's often a requirement in a registered report. Okay. So I'm just going to walk us through each element now of the stage, stage one registered report. And hopefully this will help you design your own registered reports and be a good template if you are looking to do this in your own research. Okay, So what's our information do I need to include in my introduction? In many ways, this is very similar to an introduction that you would write for a standard paper. But the important thing here is that It's in your registry report. It's a review of the literature that motivation the research question. When you first had that idea or you identified a gap in the, in the gap and knowledge gap that you wanted to fill an address in your study. And an important thing to note is that your introduction cannot be changed after you get your in principle acceptance for stage one. So the key point in trying to make here is that it's relevant literature that sets up the study aims when it was written, then it's not. A lot of the time. You can see that maybe an introduction might be changed depending on what the results of your study. Where I think the important thing here is that it's a snapshot of the existing literature that motivated this research question and this. So when you go and do your stage to analysis, your introduction won't remain, will remain unchanged. But this gives a good idea of what we know at the time when you develop these research ideas. Because there's often a temptation to keep putting in every new research study in your introduction when actually that wasn't known when you first add the study idea. Again, study aims very similar to a standard research study. And then your hypotheses need to be specific, concise, and testable. As I said, the introduction can't be changed after you're in principle, acceptance has been, has been issued. And one thing that I find quite difficult about the registered report is just to me, is making you're really making your hypotheses. Specific hypothesis table can be very useful in this case. So going from your research question to your hypothesis and that kind of information, the inference criteria going to use to assess whether or not your hypothesis has been supported. And there are lots of templates available online, especially through the OSF. Okay, so moving on to your methods. Sample characteristics. Where are you getting your data from? Are you going to exclude certain people from your data analysis of what definitions are you providing, the rationale? So are you going to maybe use unrelated participants? And if so, why, why would you do that calculation? This is relevant for both pre-existing data as well as data that you're collecting yourself. Is your sample size sufficiently

powered to detect your effective interest? Your variables of interests. So often it can be helpful to include a table of variable names. So if you're working with a pre-existing data set, what like wash is the name of that variable as it appears in the original data. Because that will of course improve the reproducibility of your findings so that if someone wanted to, I was using that dataset as well as they'll know, okay, well, this research team used this specific variable to quantify this contract construct of interests rather than just referring to the contract generally. Importantly here, what sort of quality control and preprocessing did you do? How did you go from this raw, unprocessed data through to the final data that you used in your models. And often in the registered report, it can be quite helpful to use headings to guide the reader through each element of your study. If you're collecting your own data, important things to include would be the expected sample size. Again, the rationale is there a certain amount? Is what's the sample size required for your inform the informant about your power analysis and you have a stopping rule. So when do you know, when you go into stop collecting data, what are the rationale was Grenache brush I will you provide for that stopping rule and inclusion and exclusion criteria and your sampling methods. So where are you going to recruit from? How are you going to, how are you going to do that? So what will happen if you e.g. are there contingency plans in place if recruitment is harder than expected? But the main point here is just to include as much detail as possible. It can be helpful. I found that flow diagrams can be very helpful here. So especially when you're going from your raw data through to the final days you used in your analysis. Like did you exclude certain people at certain stages? Let's say if they if their data wasn't good enough quality or e.g. if you're weren't including unrelated participants, how many people did that remove? And it can give the reader a very clear idea of how you went from this initial sample size to the final sample size that was actually used in your analysis. So just continuing on, on methods, so covariates. Why are you, why are you including each of these variables, providing clear justification for each? We shouldn't just often, people just tend to include all these variables in our analysis without really understanding what role they have or why they're including us. We should really pay as much attention to our covariates as we would to our main predictor and outcome variables. Again, an important point here in the registered report is your data preprocessing steps. So there should be a very clear journey from the unprocessed Asia through the process Dacia, as I mentioned. And it's really helpful if you can supply your code alongside your manuscript. And often a lot of journals have this as a requirement that you need to provide your code. And you can provide this at stage one and also acetate to over your head should report via online tools like GitHub and OSF and also with GitHub. Github. This is a version control software and this is a really great way to document changes that you've made to your code throughout the journey of the research project. This is good for you and your future self if you need to go back and change the kind of understand how you preprocess your data and also for future studies that are really clear. Clear example of how you how you approached each step of the preprocessing flow. And R Markdown can be really helpful for this. So this allows, this is a kind of extension of our, the programming language that allows you to have narrative texts alongside code. And I find it a really lovely way to just document each, each step in your data. Cleaning. This high level of detail really developed your understanding of the research topic and the different decisions that you make at each stage of the research journey. Okay. So the data analysis plan is probably the largest part of your stage one registered report. And this will include information on the statistical tests that you're going to run in your analysis. So these tests should map directly onto your hypotheses. And what's the most appropriate test to use. There are often many ways to analyse this or to analyse data, but again, just including information about what sort of package are going to

use that day if you're using software like or why are you doing? Why would you use a generalised linear model over a linear model? Just really thinking about the tests that you're going to use. I actually found this really helpful to develop my own understanding of statistics. And it was really, it was really, really good just to understand the different assumptions of each test and why one might be more appropriate than another one for your study. Including information on correction for multiple comparisons in advance of doing your analysis is also important here. And things like evaluation model fits. So are you, if you're going to let say, run a number of models and set them up in different ways. What are the criteria are you going to use to assess model performance and which one might fit the data better than, than the other. Again, how are you interpreting your results? So what sort of inference criteria are you going to focus on? Are you going to look at beta values? Are you looking at odds ratios? And again, if you have outliers, how are you going to treat them? Are you going to run some additional sensitivity analyses? And this is the same for missing data. And while this might sound like an awful lot of work, it really does provide a clear blueprint for you as a researcher. So once you start your analysis and stage two, you have a really clear idea of what you need to do and how you're going to do us. But my main advice here would be to consult others and ask for help because especially if this is an analysis that you haven't done before or you're using a specific technique. You don't, you're not expected or you shouldn't be expected to know the ins and outs of each analysis pipeline or each analysis approach. And also it is really important that you do ask others for help at this stage because once you have your in principle acceptance, then you can, if you get the editor, editor has permission to deal with, but you shouldn't really be going and changing main aspects of your data analysis platens, so really consult others as much as you can early in the, early in the lifecycle of this registered report. I found that a table is actually really helpful when doing this part of the registered report. And it was. A really nice way to kind of go from your research question through your true to your hypothesis. How do you have a sampling plan associated with this? What sort of analysis are you going to do? And they will wash. How are you going to interpret it? Interpret the results given these, given the outputs. So like if you get a certain beta value, what does that tell you about whether or not your hypothesis has been supported? So again, tables like this are freely available online through platforms like the OSF. Okay, so again, pilot analysis. This is optional and it's quite helpful if you are working with pre-existing data like I was. So e.g. you could use a sub-sample of the larger sample, so you can look at 10%. And this could help you with model-building and you could have a model-building sample and a test sample. You can also use things like random seed function in R. And this makes sure that you're choosing around the same random sample every time you rerun this analysis. And this is really helpful if you're working with big data and allows you to prepare a scripts that you might use later in your main analyses. And it's helpful for checking whether or not you're a statistical plans are appropriate. I would encourage you to do this if possible. So e.g. let's say if you're, in my case, I was working with a really big dataset based in the States. And I have access to multiple waves of Dacia. So I did some analysis on the earlier waves of, of this data analysis of this data set to use that then to inform the models that I was going to run in the leisure waves. Data access statement, as I mentioned, this is going to include information on what access you had to the data. So you need to provide extensive detail about the data that you access and also your coauthors have accessed. And it will also be helpful to provide links to previous published work with, let's say the status of interests. So the author is also the reviewers and also other readers have an idea of potential biases that you might have when approaching this analysis in your registered report. And usually a self certification is enough, but some journals may

require a lecture from the Dacia holder to provide proof that you haven't access this data. And cleft when you're collecting your own data. You just know that you do not have or you're not using the existing data. So this is something that you can just do yourself. Okay, so that's the stage one. And in my experience, that was definitely the longest partial registered report. And the stage to process was a lot quicker. So I suppose this will vary if you're collecting your own data, it might take longer to actually collect the data. But if you're working with pre-existing data, once you hopefully submit your stage one, it undergoes peer review, then you can change things and revise things depending on what the reviewers comments were. Um, but then for stage two, once you have your in principle acceptance, you will start your data analysis. Because the stage one is really detailed. It's just like this recipe that you're going to follow for the stage to process. That was much more straightforward in my experience. And actually taking the time to really aren't out. The wrinkles in stage one was very helpful because it meant then that I actually didn't encounter many, many changes or unexpected, unexpected scenarios in stage, in my stage two. So again, the stage two elements are your data collection, your analysis, writing up your results, your revisions you submitted for review. And you may have to make some minor revisions and then hopefully you have your paper accepted regardless of what you found after your analysis. Okay, So the new elements of your stage two manuscripts. So if you think about your registered report, the end product would be your stage one and stage two. And I would encourage you to have a look online to see what a registered report looks like. And in many ways it looks like it looks like a standard paper with just extra detail. I would say the new elements of your stage two would be your results. So this is kinda completely new. So you have your planned, then you have your exploratory analysis because you may have come across some unexpected findings from your confirmatory analyses. And of course, you have the opportunity to explore these further in your registered reports, but you just need to be very clear that they are in fact, exploratory analyses and not confirmatory analysis. Then you have your discussion and your conclusion. So these are new sections that discussing the findings and situation them in the larger context and sharing your code. So just making your code publicly available with the reviewers. On platforms such as SketchUp. And the existing elements. So you need to make minor updates maybe to your abstract to include your results, you can make some typographical changes to your introduction. If there has been a typo or if something has, has changed. And again, you can, it's important just to make note of any of these changes that you make because you do need to highlight any changes made when you submit your stage two for review. And most of the other elements need, need minor, minor updates. And sometimes if you let, if we're collecting your own data, you might need to provide a major update for your materials. But again, this will vary depending on the nature of your project. Okay, So top tips for stage to stick to your protocol, you have invested a lot of time in developing your stage one manuscript and the data analysis plan. So just stick to what you said you're going to do. But sometimes things will go differently than expected and that's okay, that is just research. And if a change is required, contact the editorial team as early as possible and keep a track or keep a record of any changes that you make to the protocol. And as I said, you don't need to report these in stage two. In my experience, the editor was happy with the minor changes are needed to make. But yeah, so, but I think the most important thing here is that you're just transparent in how you're approaching you and how you approach these changes. And again, you'll have to publicly share your code and your materials. So keep this in mind when you're, when you're making them. So the mindset I had when I was writing my code was like, okay, if someone wants to just look at my code and didn't know anything about my project, would they be able to follow what I was doing that

was keeping my future self and other readers in mind when I was writing my code was very helpful. And it's meant that my code I've heard is it's quite easy to understand and it's well commented. Importantly, the reviewers may not be the same reviewers you had during stage one. In my case, I did have the same reviewers for stage one and stage two, but this might not be the case. Okay, So registered reports or a new way of publishing, they definitely are kinda gaining popularity in recent years, but it's okay to, I suppose, have doubts and concerns about this. But, you know, some, some of the things here to consider is, what if information in my stage when manuscript becomes outdated after the stage one acceptance? Well, as I mentioned in the introduction, the motivation and rationale for your study is meant to be a snapshot of our understanding of the time in which your introduction was written. And even if there isn't a major breakthrough in our understanding of a topic changes. That shouldn't matter here because the idea of the red should report is to focus on research rigour, and integrity. And as long as you follow your data analysis plan after you're in principle acceptance, your, your findings will still be published regardless of the novelty of your findings. If something unexpected happens during data collection, I need to make some changes to the protocol that's absolutely find recent fine. Research is messy and sometimes unexpected, but often unexpected things happen. The most important thing here is just to communicate with your editor and the reviewers. If this happens. If I take longer than the standard one-year given to me at stage one, acceptance, again, liaise with your reviewers and your editor. In my experience, the peer review and kind of relationship with editors in the publication journey of a registered report is a bit more involved than the standard research article, which is quite nice. Again, just keeping that dialogue open and being transparent about the, the development of your project is really important here. What if a similar papers is published before mine? Yes, that's that's possible. Hopefully. The diesel that you're you're providing your registered report means that It's really important that we try and replicate or their findings. But because the emphasis in a registered report is on the integrity of the research rather than the novelty of the findings. Urine principle acceptance will guarantee a publication even if a similar paper is also published. Okay, So I'm coming to the end of this lecture now, some general advice so the review process can be publicly shared. So just keep this in mind and don't assume a change to your postcard is fine. Always check beforehand. So again, just keeping that dialogue open between the research team and the editor and reviewers. In stage one, I would consider using a plot of dataset to estimate things like your sample size or to run your analyses to check whether they work or answer your research questions. And one tip that I got for stage one where that was really helpful was to consider a writing style that prevents you from having to make many changes to your stage one writing afterwards. So like e.g. writing your introduction in a way that doesn't mean you have to change everything from the past, from the future tense, the past tense in your stage two, because you don't need to say, rather than we hypothesised that variable x will be associated with variable y. You can write it in a way that limits the amount of air that you'd have to make. But again, this will be dependent on your writing style and the setup of your study. And in stage to create a track, changes map document to send alongside your stage when manuscript. This will vary depending on the requirements of a journal. But just again, to keep a Dr. really document any changes that you did make to your protocol. And when sharing data sets online, if you decide to do this, make sure that you remove any identifiable information. Okay, So this is the final slide in this lecture, and I just kinda wanted to highlight that the landscape of registered reports is changing quite a loss. So now there is a platform called PCI registered reports. And this is a platform where you can submit registered reports and you can choose a stage one, and then you can choose from a list of journals after the

stage to manuscript approval. So I'll include some links to these platforms below this video that you can check out in your own time. But I think the main point I want to make here is that this is a rapidly evolving landscape, which is really exciting. And there is more and more resources being made available to help you with the registered report. And I'd really encourage you to check them out and get in touch if you have any, any questions. So thank you very much for listening. I hope that this will be a useful resource when, if and when you decide to your own registered report. But if you do have any questions, please reach out and thank you very much for listening.