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Walden Academic Skills Center Webinar -
Skill-Builder Session: Effect Size
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Good morning and welcome to the Saturday morning Skill Builder on effect size.

Good morning, Pat.

This is Dr. Zin.

For those of you logged in, we're gonna get started in about ten minutes.

All right, sounds good.

All right, thanks, Pat.

Hi, guys.

Hi, Kim.

How are you?

Hi, Pat, hi, Zin.

Hi, Kim, good morning.

Morning.
Everybody all right?

It's early where you are.

You are a Trouper.

>> And the coffee is flowing.

>> Mine as well.

That's great.

>> Especially talking about effect size.

I mean --

>> Oh, I know.

This is -- I mean -- Pat, oh, my goodness.

Yeah, see, it's 11:00 a.m. here, so it's not as bad for me.

But for you guys it's early.

And Zin especially.

>> And early for our students too.

>> Yes, and I so appreciate them being with us today.

I'm sure they're gonna get a lot of great information.

So we have a good diverse group here.

>> Cool.

>> Let's see.

I don't know.
Jennifer from the Caribbean, and Huda from Jordan.

Neat.

We have -- I think we have all the time zones in North America covered.

Oh, Casablanca, that's cool.

Oh, there's a Fort Worth person.

Got to congratulate Huda, passed oral defense recently.

That is amazing.

That's awesome.

Well done.

Huda.

Oh, yeah, Cindy from Fort Worth.

Got a few Californians in here as well.

See, they're up early like you.

Just to hear you.

Got some New Yorkers?

No, I haven't seen any networkers yet.

New Yorkers yet.

Let's see.
So we have -- yep, we're doing good this morning.

Trinidad and Tobago.

>> And we have James from -- I love seeing all of these.

Colorado.

>> Yeah, it's awesome.

>> James is from Wichita falls, Texas, because last Saturday we brought our daughter to college and she's going to witnessed western state which is in -- but you would think midwestern state would be, like, Kansas, right?

No, it's in Texas.

It's in Wichita Falls, Texas.

So good morning, James.

>> So, oh, I think a question.

Everybody, we're starting at 11:00 a.m. eastern.

So we have about seven minutes.

I just got a question pop up.

And I our captionist is working hard in there.

Thank you.

So, you know, while we're waiting --
>> Go ahead, Pat, I'm sorry.

Zin.

Sometimes with Zin we just have the interest slide.

I just wanted to just let students know, because I had a student that raised their hand.

So, everyone, because we have so many people on the meeting, we have -- we are not using the raised hand feature, so even though you have it on your screen, for Pat and Zin, any questions related to the topic of effect size, please enter your questions in the Q&A pod.

And any questions that are regarding our tutoring services or our resources or any kind of technical issues with the connect platform, you can put that in the chat box, or just a -- or chat with us as well.

But we kind of like to keep things a little bit separate in regard to the questions for the meeting because that way, Pat and Zin can concentrate just in one area because it's hard for them to do the presentation and the chat and the Q&A.
So that's what we're asking.

So, again, if you raise your hand, we probably will not answer it or we won't see it.

We got about five minutes.

Also, too, I'll just let you know that the links in the presentations are active links, so if you push on them, it'll take you to where you need to go as far as a link is concerned.

If you have any questions about the recording or the transcript, you can email myself.

My name is Kim.

I'm the coordinator of instructional support for the Academic Skills Center tutoring services program.

You can email me at asctutorring@waldenu.edu.

And you can reach Pat and Zin at stats support at Waldenu.edu.

And we have some time later on, I'll go over the tutoring process, but I just wanted to give everybody a heads-up here.

>> There is now Scott from upstate New York.

>> Oh, yay!
I have a fellow New Yorker.

Oh, I see that.

Yes, hi, Scott.

And I also -- I invited Candace -- Candace, Pat, to join us today.

So I don't know if she was able to register and join us, but I did invite her yesterday.

So we may have one of our new stats tutors on with us today.

>> Oh, wonderful.

That's great.

>> Maybe we can promote her to presenter --

>> And she could say hello.

>> Yeah.

>> Yeah.

Candace, if you're here, please let us know in the chat.

>> Unless she's using --

[Talking at the same time]

>> That's possible.
I was looking for in the participant list last night. It was kind of last-minute with when I spoke with her, so -- but I thought maybe I'd just give her a shout-out.

We have a Philly person. I'm from Pennsylvania originally and I have family in Philadelphia. Philly person.

>> Looks like we have a good mix of disciplines too. Looks like we have business, psychology, public health, education.

Common denominator on all of those frankly is statistics. So that's obviously why you're all here.

>> Yep, to learn about effect size.

>> Good luck.

[ Laughter ]

>> Saturday mornings, talk about statistics. You have to have a love for it.

>> Yes, and we all have a love for statistics.

>> Yes, we do.
>> Some of us it's a love/hate.

[ Laughter ]

>> That is true, Pat.

You know what?

I -- go ahead.

>> Looks like we have a one-minute warning.

Getting ready to start.

>> Yep, we're getting ready.

And also, too, everybody, the meeting's being recorded and it will be on our Skill Builder website I would say by Wednesday.

So I'm gonna put some links in our chat for students while you're getting ready to -- and I'll also do a brief introduction if you'd like.

>> Sure.

>> Okay.

>> Let me just get my --

>> Okay, looks like we're at the top of the hour, whatever time that is for all of you.

I'm gonna go ahead and start the recording.
Okay, good morning, and welcome to our Skill Builder this morning on effect size.

My name is Pat Dunn.

And I'm joined by two of my colleagues in the Academic Skills Center, Dr. Zin Htway and Kim Palermo-Kielb.

Good morning, Zin and Kim.

>> Good morning, Pat.

Good morning, Kim.

Glad to be here today.

>> Yeah.

And this morning we're gonna talk about effect size.

We have a really good group.

We've already been looking at the, you know, where you all live and what you study, and that's awesome.

The common denominator for all of our disciplines whether it's public health, education, management, psychology, is statistics.

And a really important aspect, and, frankly, at least for me, sometimes a blind spot is effect size.

I get a little confused sometimes, and I know the students that I tutor get a -- get confused as well.
So we thought we'd devote a whole session on effect size and all of the kind of the related ideas.

And to do that, we actually brought in our big guns, both Dr. Htway and Kim.

So we have a good group here.

We should have a really good discussion.

The way these work with the Skill Builders is you're actually able to ask questions in the Q&A pod. And we'll try to get those questions either through our conversation or we'll try to at least address them at the end of the program.

We may not be able to address all of the questions depending on how complicated or specific the question is, so we also have other resources.

So I'm gonna start with Kim who's gonna talk to us a little bit about the Academic Skills Center and some of the services that we have available.

And while she's doing that, I'm gonna click to our last slide.

Which has a couple of links.
Well, thanks everybody.

So if you're just joining the webinar, I spoke a little bit earlier about this, so if you're just joining the webinar, I'll fill you in.

Zin and Pat and myself, we work for the Academic Skills Center.

We work for a program.

It's called the tutoring services program.

And the Academic Skills Center tutor services program started as a peer mentor program back in 2011.

There were some barrier courses that Walden had, to do some peer modeling, and at one time we all were embedded in courses to help students.

So for instance, Pat and Zin were embedded in the biostatistics or the public health courses and I was embedded in the research statistics courses.

And then now Pat and Zin are our instructional support specialists.

They no longer are embedded in the courses.

They actually tutor for the entire university I should say.
And we offer tutoring through a platform called WC online.

And you can see that on your screen.

The Waldenu.mywconline link you see right there.

Non-dissertation statistics, which is more course related.

And then we have the dissertation related to statistics.

You can find Pat on the non-determination related Statistics.

We also have another tutor on there named Janine.

And onboarding three more.

And Zin is on the dissertation statistics schedule.

And we also have another tutor -- I'm sorry, another instructional support specialist, who started, Sarah Inkpen.

We also have tutoring in MS office which is Excel and PowerPoint and Word.

And our tutors are -- the scheduling is open Monday through Sunday.
There's a schedule from I believe it's like 6:00 a.m. through 11:00 p.m.

Of course that depends on the tutor's availability.

And time zones and whatnot.

Tutoring sessions are scheduled in eastern standard time, so please remember that.

And again, they are 60 minutes long, and you can meet with a tutor same day if you need to or you can book an appointment I would say up to about two weeks out.

We also have a wait list feature on the schedule that allows you to put your name in there if you want to go in there at a certain time with a certain tutor.

And then the WC Online will send you an automated email.

Another way that you can talk with a tutor or work with a tutor is through our roll accounts.

We have specialized email accounts that our tutors monitor on a daily basis.

Stats support is one of them and that is for our statistics tutor.

So if you have a quick question, you can just shoot an
email to that stats support.

And Zin I know is very active in that email account and so is Janine and they will get back to you typically within 24 hours.

We also offer roll accounts for Word. So we have MS Word, and we also have PowerPoint help.

And we just recently did Office drop-in sessions that we're piloting, so if you go to our website, the ASC tutoring website or the Academic Skills Center home page, you can get an idea to the office center drop-ins.

So I think I covered almost everything, Pat. And if anybody has any questions, please feel free to chat with me.

I believe I'm Walden ASC in the chat. And I'll put some links in there for everyone on how to get to Skill Builders online and how to get to our tutoring page.

And I'll get you guys get started.

>> And, Kim, another resource, and this will segue
right into our topic.

These webinars are recorded.

>> Yep.

>> And we post these -- we have a YouTube channel. We may be moving to a different platform, but the videos are still begun be available. But a play list that we used last year was called "Stats chat."

And Dr. Htway actually did a whole series on a tool called G*Power. And G*Power is a -- I think something we -- and, Zin, maybe you can comment a little bit on it, like, maybe why we use G*Power and how it helps with sample size calculation, and quite frankly to understand how to use G*Power, you do have to kind of understand the backbone of effect size.

So -- yeah, go ahead, Zin.

>> Okay, so, you know, the reason why we recommend students to use G*Power or any other, you know, sample size calculator is that for every statistical test that a student, a dissertation student may be planning to
use or will be using to analyze their data, there are
different mathematical calculations to determine what
sample size you're going to need.
And some of the these calculations are extremely
complicated.
So it's better to have a computer calculation for that
and which G*Power does for you.
G*Power is very easy software to use.
It's a quick free download.
Takes no time at all to just plug in the numbers and
essentially it puts out an answer of what your minimum
sample size should be based on the parameters.
The parameters for calculating sample size, they're
actually four components.
You have -- well, first off, the first component is you
have to select your statistical test.
But you have to take into consideration the Alpha.
You have to be able to understand what the beta is.
And then we look at the effect size.
And then we have our sample size.
And those four variables, since all these equations involve those four variables and are actually equal to the value of 1, if you have three of those variables, you can calculate the fourth variable. Doesn't matter which three you have.

You can calculate the fourth variable.

And that's what G*Power software will do for you. You just ask G*Power what you want to know, usually for students that are working on their proposals to, you know, trying to calculate sample size, so you put in your Alpha, the beta or the power, and then the effect size and it gives you the sample size.

After the data is collected and analyzed, you may want to do a post hoc power analysis to see how much power you actually achieved from your sample, and then once again you can set G*Power to a do a boast hoc power analysis.

Or if you want to calculate the effect size, it can calculate that for you as well.

And so those are the reasons to use G*Power or any other sample size calculator.
It's mainly because the mathematical calculations are so complicated and they vary from statistical test to statistical test.

So --

>> Yeah, that's a great point.

And even taking a step back into why it's even important, I used to hear studies refer to, you know, it was -- the study was underpowered, or, you know, there wasn't enough power in the sample to answer the research question.

And I have to be honest with you. It took me a while to even understand what that meant. What it meant was, they basically miss calculated the sample size when they designed the study in the first place.

And, you know, and that can be a critical error because you're -- you know, if you're not able to answer your research question, then, you know, you've, you know, you've really done a poor job in -- in designing your study.
So --

>> Right.

>> Yep.

>> Yeah, and, you know, Pat, since you bring up power and what really is power, power, you know, is defined by Harvey Motulsky and for those of you looking for good resources to understand biostatistics and also power analysis, I recommend -- there's a number of texts by Harvey and the other is Jacob Cohen, and Jacob Cohen's, when we talk about Cohen's G or H, the different coefficients, that's him.

That's Jacob Cohen.

So they're both really good resources for those who want to learn more.

Regarding power, Motulsky defines power as, power is the strength to actually find a statistically significant result.

>> Yep.

>> I know it's an odd concept to think about and for most of our research, we go with an 80% power so you have essentially an 80% chance of determining a
statistically significant result.

This is different than a P value.

It relates more so towards the errors.

Regarding, like --

>> Powers relate more to the beta.

Is that correct?

>> Correct.

Right, you're right.

The beta power is actually 1 minus beta, and beta is a percentage value.

We generally use .20, unless of course you have a reason for using something different.

The beta relates to the type II error, which is if you're familiar with, that is essentially the facilities -- it's the false negative.

It's where you reject the null hypothesis when you actually should have retained the null hypothesis.

Or type I errors where you accept the alternative hypothesis when data -- when you should have kept the null hypothesis.
And so those two relate back to -- so with the type I error, we look at -- we look more towards the Alpha, and the Alpha value, generally for -- if you're going with a, say, a 95% level of precision, then you would select an Alpha value of .05.

Precision and Alpha are very closely related.

But they're actually different.

Precision goes back to your statistical test where Alpha is actually used for your sample size or your power analysis calculations.

>> You're also -- probability.

Right?

So --

>> correct.

>> The 95%, it's the probability the two groups are different due to chance or that they're -- the two groups are related due to chance.

And so when you say -- you're meaning more about the actual -- is it more the accuracy or the more precise the measure is?

>> The precision, you know, when we -- precision
actually related to the two standard deviation or whatever your confidence intervals are going to be.
And so that's where our level of precision comes from.
And then with the Alpha, they are related, but they're actually slightly different.
But for most intents and purposes, if you're gonna be using the 95% confidence interval, then you're gonna want to use an Alpha .05.
That's sort of the way they go together from that sense.
And then -- then when you look at power, which of course is the beta is 1 minus beta, and then that leaves us, lastly, with the effect size.
And -- so effect size, as you were saying earlier, it's a concept that's somewhat difficult to understand when you're trying to read it, but the effect size is really the difference that you're looking for.
Often, you know, we have a simple example.
Say we took a survey of the annual income of people of families that say, I'm just gonna say, you know, buy a
Honda versus families who buy, say, a Mercedes.

We assume there's gonna be a difference between the annual incomes.

That difference that we calculate out, that actual difference of, say, families that buy a Honda, they're average energy income is 60,000.

That $30,000 difference is actually the effect.

That is the effect difference.

In that particular example, the effect difference is in dollars.

However, we can't use dollars for every research question.

It doesn't really work out so well.

So we need to get rid of the units.

And so in the -- these calculations for power analysis generally somewhere in the calculation, that effect is divided by the standard deviation, which eliminates the units.

And then you get a coefficient.

And that's what we look at in terms of the effect size.

So that little value that shows up in -- shows up in
Let me go back even to the start here.

When we're talking -- I think what you may be referring to also with precision, another way to think of that is the variation.

In the data.

And, you know, that doesn't mean that it was measured poorly.

It's just some variables have more variability than others.

So when you look at a normal distribution of a variable, you know, you're gonna have a mean, you're gonna have a standard deviation, and you're gonna have 95% confidence intervals.

And from one variable to the next, you may have the same mean, but you may have greater variation.

And you need to account for that when you're thinking of something like a fizz.
Effect size.

Just a couple of --

>> Correct.

>> Similar to Dr. Htway's example here.

I'm using this example with my commute time.

So I have -- these are two, you know, two groups.

My -- during rush hour and during normal times, and then I have my morning commute and my evening commute.

So as you can see, as the -- not only the variation but as the difference between the two means varies, that's what we're talking about.

That's what you need to -- oops -- that's what you need to account for when we're talking about effect size.

>> Right, and for those who are not familiar with, you know, Dr. Dunn's graphs here, these are, you know, bell-shaped curves, and, you know, as we see on the left, we've got the mean in the center in blue, and then we've got 60 and 90.

Those I'm gonna assume are two standard deviations, two to the left and two the right.

You go up, and within that, if you take some scissors
and cut that area out, it equals about 95% of the sample.

And then same for the bell curve on the right which are indicated in red.

And so when we look to compare if there's a difference between the means, we're looking to see if there's an overlap within the area of the 95% confidence interval.

If there's -- in this example, there's no overlap between 90 and 95 for the two groups, so we would say that the commute times are actually different.

But I think in the next -- the other slide where there is an overlap, on this slide, we actually see that there is an overlap in the 95% confidence range, and so we would say there is no difference because what we're looking at is not the point estimate but actually the population estimate which is our confidence interval.

So we're actually comparing confidence intervals.

>> Yep.

And I know some of our students, especially when you're getting towards your, you know, putting together your
chapter 3 in your dissertations, you're looking for, you know, you're having to compute the effect size, and in reality what you're doing, because you're having to figure this out before you've actually collected your data, because you have to -- you have to, you know, basically plan for your study, how many -- how large is your sample going to be?

So is that can be very confusing.

This is not something that's calculated when you're calculating your results.

Of course, as Dr. Htway said, you can get a power calculation, and you can get, you know, obviously the effect size at that point, but you kind of need to know that before you've even run your study.

And to do that, you know, there's really two ways that I -- easy ways that I can think of to do that.

One is your literature review.

You know, just knowing as much as you can about your variables and seeing if, you know, if some similar types of studies have been done so that you have a good
estimation of what that effect size is going to be.

And if that's not available, another option may be running a pilot study.

>> That's true.

Yeah, really good points.

And getting back to effect size, Cohen pretty much came up with the scale of small, medium, and large, and these somewhat -- there's different values of effect size based on different statistical tests and that's where we get the Cohen's D and K and J be and L and such.

And so forth.

Being that the fact that he came up with these various effect sizes, somewhat like T-shirt sizes, it's not really agreed upon fully by other statisticians.

So they have beliefs that you should calculate your effect size, like what Pat was saying, for small, they consider the difference between means as equal to 1/5 standard deviation, and then a large yes, sir effect size is equal to 80% of the standard deviation.
But, you know, as students writing a proposal, you're not gonna know what the standard deviation actually is for your study, so you really can't go ahead and, you know, pick a number out of the air unless you do something like, say, you know, like check the literature or you do a pilot study and such.

But, you know, the difference between, say, a small, medium, and large effect size, if we look at, you know, for a small effect size, we see that, you know, we're all very common -- this is really well known that they recommend a baby aspirin every day for people over a certain age.

And the reason why that's actually recommended is because for those people over a certain age who take a baby aspirin every day, it will prevent three heart attacks in 10,000 people.

That's a really, really small effect size difference.

All right?

Three out of 10,000.

Baby aspirin also being inexpensive and doesn't really cause any harm, it's pretty important to those three
people, but we're looking at 10,000 people to find

that.

On the other end of the spectrum, a larger effect size

would be, say, the difference between life and death,

and for that, we would look at, say, examples would be

like, say, clinical trials for new drugs, for, you

know, chemo therapy agents or new oncological agents.

The difference between life and death is a pretty

big difference, and so that would be considered a

larger effect size.

Interestingly, the way the calculations work for the

power analysis for all the different statistical tests,

in general, I think it's almost true for all of them,

if you're looking for a small effect size, a small

difference, your sample size increases quite a bit.

You use a larger sample size, because the larger

sample, then you can actually compare the truer mean.

For a large effect size, you really don't need to have

that large of a sample.

The sample size actually shrinks.
If any of you are involved in clinical trials, you'll see that clinical trials do not involve large sample sizes.

To make a determination whether or not this new drug or this medical procedure makes a large effect difference between, say, the control and the experimental group.

So.

>> Yes, absolutely, and of course, you know, we have to be good stewards of our resources, so an argument might be, well, why don't I just have an enormous sample size for every study that I do?

Well, there's obvious problems with that, not the least of which is the budget for your study.

But also, you're just putting -- there's a risk in almost any type of study, even giving people a baby aspirin.

It's pretty harmless but, you know, there is probably some risk maybe?

So, you know, the argument against just having, you know, super sized sample sizes is you're putting people at risk that you wouldn't have needed to do if you had
actually just done a little bit more work on calculating your power and your effect size to determine your sample.

>> Right, yeah, I fully agree with you, Pat, on that. And that's why, you know, when we look at effect size, you really have to have a good understanding in terms of the sample size and the errors, your type one error, there's even a type three error which has to do with if you go in the wrong direction, you find a statistically significant result but it's actually directionally incorrect.

And also to understand, you know, about power and beta. So for those of you in our audience, you know, you really have to learn about the entire package of all the variables which make up these power analysis calculations to really get a good understanding of effect size.

And just keep in mind, though, if you're looking for a small effect, you're gonna need a much larger sample size and that's just the way the mathematical
calculations work.

And that these are really just coefficients, coefficient values because the formula in there is divided by the standard deviation.

And so that eliminates the units, so you don't have to be concerned about if you're talking about dollars or inches or looking at days of survival.

It's just a coefficient value.

So --

>> And, you know, another argument could be, well, why don't I just make my power, you know, 95%?

And again, you know, if you look at the -- always go back to your hypothesis testing.

So you're running a test.

And you're testing a hypothesis.

And there's only four scenarios.

You correctly reject the null.

You correctly retain the null.

Or you have a type one or a type two error.

So if you -- if you increase the power, you're also making a tradeoff on your Alpha.
So, again, you know, the .05 and the 80 is kind of what we've determined to be kind of the best balance.

It isn't always -- that mix isn't always the right balance.

But that's why we -- why we used those two typically.

>> Right, and then once again, you know, if you increase power, and you want to maintain that, the Alpha .05 and say you want to get power up to .95. Once again your sample size increases quite a bit, and then you start looking at consuming more resources or having, you know, participants at greater risk.

There's a lot of different factors to take into consideration, and those are considerations that need to be discussed with your chair and your committee before making those -- you know, before committing to those values.

So -- all right, Pat, do we you think we should take a few question cans here?

>> Yeah, I think we should.

Looks like the first one we have here is a question
about G*Power.

So should you allow G*Power to determine -- should you always, I guess the question is should you always allow G*Power to determine the effect size?

>> G*Power can be used after your analysis to calculate your achieved effect size.

All of these values in determining -- when you're selecting the three out of four, all of those the three out of four are actually determined by the researcher. They're actually all arbitrary unless of course you're using published literature, but once again it becomes the researcher's decision.

So you're essentially picking three and G*Power is doing the calculation for the four.

It doesn't matter which way you go with it.

But for effect size, after the facts, it would be achieved effect size is what you're actually looking at.

>> And you're making a really good point and a really good distinction here.

So G*Power itself is not the one determining the effect
You are as the researcher.

>> correct.

>> You're basing that on, you know, the information you have available.

That's from the literature, if it's from your pilot study.

If it's from your own personal experience.

But the G*Power is simply the tool.

And you're plugging these assumptions into the tool, and it's doing the heavy math for you.

But don't deflect -- neglect the responsibility onto the G*Power.

You are the one who is -- and I'm talking about beforehand in estimating your sample size.

You're the one who has to determine what that effect size is going to be.

>> Right, it's, you know, what is the size of the effect you're looking for?

And how much difference are you looking for?
Because, you know, for statistics, as we all know, it's not exact, and so you have to look at -- it really gets back to that population measure to see what is -- what are you actually trying to figure?

>> We have a question here.

Is effect size a descriptive statistic or an inferential statistic.

That's an interesting question.

>> I'm leaning towards inferential statistic.

Generally describes the data, not the analysis.

Where the effect size is actually in the analysis.

It is an interest question.

I haven't seen that before.

>> Oops.

Is the effect size -- I'm reading Natasha's question here.

Oh, the difference 2002 two variables, you know,

Natasha, so the effect size is -- yeah, it's the magnitude of the difference between the two variables.

So using my little graph on the top here, it's the difference those two samples.
Between my morning commute and my evening commute.

That's what the effect size is looking at.

>> And Teresa has, effect size is comparing the difference in confidence intervals?

For -- for a T-test or a ANOVA, that is true what the effect size would be, but for different statistical tests, if you've got, say, you know, logistic regression or -- or a correlation, you know, multilinear correlation, it's not the difference between the means.

But you're looking at -- but it does -- yeah, it's -- it is really that the comparison of the population, the -- the population measures to determine what the differences actually are.

So I guess you could say it's between the confidence intervals.

>> Another question about, you know, basically the relationship between the power and the beta.

As Dr. Htway mentioned earlier, these two numbers are mathematically related.
So one can't be used to prevent the other.

The power is 1 minus the beta.

So if your beta is .20, or 20%, then your power is .8, or .8 or 80%.

>> Correct.

Which again, it's actually defined as the power to kind a statistically significant result.

It's an interesting definition.

>> Has a question about, is there an acceptable norm or number for the effect size?

So the way I would approach that, Kenneth, you know, every variable has different characteristics, so if you're talking about each individual variable, you know, there's not a norm, but if you look at something like the coffen's D for example, if we calculated a coffen's D in this example of my commute times, it's related to the standard deviations.

So that's where Dr. Htway mentioned there's different standards for small, medium, and large effect sizes.

So it's the -- basically the difference between the, you know, the two means divided by the, you know, the...
population standard deviation and basically.

>> Right, and then, you know, I'm sorry, continuing on, for each different -- for each type of statistical test, there are different values in that small, medium, and large.

Just looking through, you know, we have -- there's a cohen's D, then there's a cohen's R which is on a different scale.

There's a cohen's Q on a different scale.
There's the cohen's G on a different scale and there's H and W and F and F squared.

And so once again, it gets back to what is the size of the effect you're looking for?

You know, the effect as in terms of related to your research questions.

Are you looking for something -- a small effect, right?

Or are you looking for something, like a really large effect?

Most times, for most research questions that I've seen, I would say a medium effect size would be fine.
But there are times when a committee or methodologist may suggest a small to medium effect size or just a small effect size, if you're looking for, you know, a subtle difference because of the importance of the outcome so to seek.

>> If you really aren't sure, are you better to err towards estimating on a small effect size?

>> You know, that's a good question, Pat, because if you go from a medium to small, it can change your sample size dramatically, to a point where it's actually not feasible to finish a dissertation.

And that goes back to, you know, the beginning of our presentation is why use G*Power?

You know, you use G*Power so you can get -- it'll calculate out the minimum sample size you need for your study.

And if you go ahead and you, you know, you put in your parameters and G*Power puts out a number that says 1800, if you're looking at, say, interviewing 1800 people, that could take you quite some time.

And you may not be able to achieve that within, say, a
certain time frame of three weeks to interview 1800 people.

So you have to be -- you have -- it's a good actual to use just to give the researcher an idea of what to actually expect.

>> Shawn had a question about explaining the format of my graph.

So my graphs, first of all, disclaimer, are pretty crude.

But what we're looking at here in this example is the --

[ Laughter ]

I'm using basic, you know, PowerPoint tool to create -- to try to do a bell.

But basically the concept, Shawn, is if you look at the graph on the left, and you look at the blue lines, and maybe if I use the other graph, it might be a little bit easier to see.

The one in the blue, so that's -- that's a bell-shaped curve with, you know, and the -- with the 75 being the
The 60 and 90 being the confidence intervals.

And it's a little bit arbitrary.

I'm just trying to show a point here.

They're probably not positioned exactly where they should be.

But what I'm trying to demonstrate here is then if you have another sample, so you're comparing two means, which is what you would do in a T-test.

So I'm comparing -- so it takes me -- and these are actual numbers to be honest with you.

It takes me about 75 minutes to Drive to work in the morning.

In the evening, the traffic is heavier, and it takes me an average of 105 minutes.

So if I were to do a, you know, if I had a sample, you know, maybe the next 30 commutes, and, you know, I literally, you know, jotted down my morning commute time and my evening commute time, and then I ran a T-test, and so the point here is -- although it's called a comparing means test, what's also really
important in this calculation is the variation.
Which are defined by these confidence intervals.
So that's kind of the concept of the graph here.

>> Okay, Pat, there's --

>> Next question.

Will Cohen's D --

[ Inaudible ]

For a single participant design?

>> Well --

>> Isn't Cohen's D designed to have two means?

>> Correct.

But, you know, with a single participant, it really gets back to, you could have a repeated measures T-test, which once again, you have a single participant, you're just measuring that person a couple of times.

So it really gets back to which statistical test you're planning on using, or what would be appropriate to answer your research questions.

>> Yep.
Now, we had, you know, we had a question from Denise.

I don't know if she got it in there.

Hold on.

I don't see it in the Q&A.

And this may have already been asked before she had noted but how is appropriate sample size determined using G*Power calculator?

That might be more for a tutoring session, but I don’t know if you can go over that quickly?

>> You know what?

I can go over it quickly.

>> Yeah, we have 20 minutes, so we have time.

>> Okay, no problem.

So regarding G*Power, so G*Power, you can look it up.

It's a free download.

It installs onto your computer.

Just make sure you select the right one, if you're using a PC or a Mac.

It opens up in a window.

The first thing you want to do is on the left hand side
there's a little dropdown menu for test family.

And I'm looking at mine right now.

There's different test family.

That's the exact test, F test, T test, chi-square test

and Z test.

Based on the statistical test you're interested in, you
can just take a look at select the correct test family.

I'm just gonna go ahead and pick F test.

And then the next box you have is the statistical test.

And from there as a dropdown menu and if you were doing
MANOVA or ANOVA or a linear regression, I'm gonna go
ahead and click on linear multiple regression fixed
model, R squared deviation from zero, which is
appropriate for simple linear regression and multiple
linear regression analyses.

The next option you're gonna choose is to type a power
analysis and this is where Pat and I have been
discussed that you could a compute required sample size
given the Alpha, power and effect size.

And that's your first menu.
Or you could do criterion.

Compute required Alpha given power, effect size and sample size.

Right?

One guess you're selecting which of the three values you have.

The three out of the four values, because there's the four variables.

There's also the post hoc given Alpha, sample size and effect size and this is what you would do in chapter 4 after you've collected all of your data.

And then the last one is -- once again, you're picking three out of four.

For this I'm just gonna go ahead and pick a priori.

And now I put in my variables.

Under effect size, I'm gonna go ahead and keep it with the medium which is a .15 and that's for this particular statistical test.

The Alpha I'm gonna leave it at -- since I'm using a 95% confidence interval, I'm gonna leave my Alpha at to 5.
And the power, we're gonna go with an 80% power, and regarding my predictors, I'm gonna say that I have one dependent variable, but I have five independent variables and those five independent variables are my predictors.

So I just put in 5.

I hit the calculate button.

And G*Power calculates out for me that I need a total sample size of 92.

92 participants minimum to achieve these numbers.

Now, if I was to go ahead and change my effect size, because as we were discussing earlier, the smaller effect size increases your sample size.

So if I -- if I change my effect size.

If I decrease it from .15 which is medium, and I change it to a small, which is .02, according to Cohen.

.02, then I keep all the other parameters together with my five predictors and I calculate, my sample size actually jumped to 647.

Originally with a medium effect size, I had 92.
Now using a small effect size, it goes to 648.

This is why Dr. Dunn and I recommend that you use G*Power or some other calculating software in your proposal so you know what to expect when you're going out to collect data.

>> Zin, can you show your screen again?

Because we lost that end part of the presentation.

>> Oh, I'm sorry.

Were you actually able to see my screen?

>> We saw the beginning of it.

But --

>> That was me -- I shared my screen.

>> Oh.

No.

We just went back to the presentation.

It was like the last couple talking points.

It was like the last few minutes, Zin, we lost you.

>> Oh, well, Pat, was that your screen that you were showing?

Or was that mine?

Oh, okay.
Can you put your screen back up?

>> We have two hosts, this is the problem.

>> Pat, you go ahead and -- you show yours, Pat, and

I'll walk you through it.

>> Yeah, could you represent?

I'm so sorry, because students are saying that they
missed it.

[ Laughter ]

>> Oh, okay.

We saw the first few minutes, when you just started, it
was just wonderful.

And then it went blank back to the presentation.

>> That was me horsing around.

>> That's Pat.

>> Oh, okay.

Okay.

Start over.

[ Laughter ]

Yes.

>> Okay.
>> Okay.

>> Yeah.

>> All right, Pat, go ahead.

Well you see the dropdown menu for the test family and we go to an F test.

And then on the dropdown menu there we're gonna use the linear multiple regression, fixed -- down at the bottom there, yeah, R squared change from zero, one up.

Just go one up from that one.

There you go.

Actually, I'm gonna go back to -- there we go.

Now, the type of power analysis we'll keep it at a priori, under the effect size, the F square, we're gonna leave that at .15 which is a medium.

We'll leave the Alpha error probability at .05.

>> I wanted to show too, if you hover over the box, it actually gives you the effect size conventions.

So I'm sorry, what was the -- what was the Alpha?

>> We'll leave the Alpha at .05.

>> Okay.

>> And we'll change the power to .80.
>> Yep.

>> And the number of predictors, we're gonna go with 5, 6, 7, 8, 9. We'll change it from 2 to 5.

So we've got 5 independent variables since this is a multiple linear regression.

Now go ahead and click on the calculate button.

And as you can see on the right-hand side, total sample size, we have 92, and below that is the actual power which is .8041921.

So for a medium effect size, our sample size calculator tells us that we need a minimum of 92.

Now, Pat, if you can, go back to the effect size.

And we're gonna change that from the medium which is .15, and we'll change to that a small which is .02.

And then we'll click on calculate again.

Excuse me.

And we'll see that the total sample size calculated now at 647.

You can see, so if you're looking for a smaller effect, your sample size increases -- sample size increases
substantially.
And since we have your screen showing, let's just go
back to effect size and let's just put in large which
is going to be .35.
And then click on calculate.
>> Mm-hmm.
>> And so we can see now for large effect size, our
sample size actually decreased to 43, because
originally for a medium effect size, it was at 92.
So this is the way, you know, it's really nice to use
G*Power because it does all these complicated
mathematical calculations for you.
>> Absolutely.
>> And there's -- and there's so many different --
there's a few websites that actually give more detailed
instructions on how to actually use G*Power for
different statistical tests.
If you're looking for, say, proportions, and, you know,
running pro portions in terms of your research
questions can be somewhat -- like I say, you can really
step in quicksand when you're dealing with proportions,
because if you're looking for a small effect between two groups in terms of proportions, the sample size increases into the thousands.

There was a student I was working with last year, she was looking to see the difference, whether or not children who were on an HIV regiment versus those that were not, the proportion of students in comparison for those students developing measles.

And even though for one group she had 1500 participants and for the other group she had I think 2500 participants, she had insufficient power to report her results because the difference of proportions was so small.

So you have to be really, really careful about doing proportions.

But you can do that -- you can calculate out what you need from G*Power with proportions, but you have to have -- as Pat was suggesting earlier, get some information from the literature, what was done previously and put those things.
Logistic regression is another one which is a little tricky to do where you have to have some published literature data or pilot study to determine what you're going to need because you have to actually put in those numbers into G*Power.

So -- all right.

>> Okay.

Great.

I'm gonna --

>> So we have a couple more questions.

We have about ten more minutes.

So I don't know if you guys can see them.

Jean Pierre, other than G*Power, what other tool can we use to calculate stats support sample size?

Other than G*Power?

>> There's actually quite a few sample size calculators online.

Sometimes -- I do statistics all day long at different locations and I don't always have G*Power with me.

So I just do a Google search of sample size calculator and they come up.
And the inputs are still the same.

You know, your Alpha, your power or beta, your sample size and your effect size.

And it's kind of nice to have because you can actually specify, I want a sample size calculator for MANOVA, and it'll find you one.

So there's quite a few out there.

But really, once again, go back to -- make sure that it's okay by your committee.

You know, because the committees have, you know, final say in all of this.

So you really have to check with your chair and committee members to make sure that that particular calculator is appropriate.

>> So Barbara had a question just about hypothesis testing in general.

So I just want to make the point that this is all related to hypothesis testing, okay?

When you're doing your study, you know, you have, you know, your problem statement, the purpose of your
study, if you're doing a quantitative study, you're
gonna have a hypothesis, and it's gonna include a null
and an alternative, and what you're doing with all of
these statistical techniques is you're testing that
hypothesis.

So it's vital that you understand that concept and what
we're talking about with Alphas and betas, type one and
type two is basically, you know, it -- because we're
dealing with probability, not certainty, we're dealing
with samples, so we're testing using those statistical
techniques.

>> Right, and one thing, you know, just to add on to
Dr. Dunn's description there is that to avoid doing --
it's called P-hacking, where you keep testing and
testing until you get a statistically significant
result.

You really shouldn't do that.

It's really not ethical.

You keep testing a different way until you get
something that's significant so you can actually get
published.
That's actually not appropriate.

So when you do your hypothesis testing, essentially the results you get is the results you get.

And that is what you need to work with.

So even if you wind up retaining the null, so be it.

Then -- that's still of importance and it's still of value.

>> Yeah.

>> Yeah, it -- what you're describing there is actually cheating in a way.

It's defeating one of the major premises of the testing in the first place.

If you just collected a whole bunch of data, didn't really have a hypothesis and then looked after the fact, so that's called post hop testing, there are some examples where post hock testing is very appropriate, but just simply collecting data and then forming your hypothesis after you've collected your data is actually not way research works.

And you'll see studies like that where maybe, you know,
the primary hypothesis, there's some other findings, and the reality is, you have to go back and confirm those findings as a primary hypothesis.

You can't just take those to the bank and say, okay, we've now tested this, because you really haven't.

>> Right.

So let's see.

Teresa has a question.

Just to clarify the small, medium, and large effect size numbers are given numbers?

Those numbers that we have for that particular test were defined by Jacob Cohen.

For other ways to calculate out, you know, there's like a small would be -- it varies from statistical to statistical test.

But you'll hear from Motulsky, the difference between means is equal to 1/5 of the standard deviation and a medium is equal to 1/2 of the standard deviation and a large effect is equal to -- so there is -- I would say there is some room for negotiation.

But once again, Teresa, you need to work this out with
your committee and your chair.

In terms of effect size.

You know, for sample size calculation, I'd recommend you use the parameters that are in G*Power.

If G*Power is appropriate with your committee.

And then that way you'll know what minimum sample size you need.

Once you have your data and your sample, then you can do a post hoc and look at the achieved effect size.

That's totally appropriate to report out in chapter 4, but that's only after you have all of your data collected.

So --

>> So we have --

>> That's a really good questions.

>> Oh, go ahead, Pat.

I just, you know, also wanted to let students know, um, we're getting towards -- I just want to let students know, Pat and Zin, you know, if there is -- if we can't get to the question, I mean, we're here an hour, we did
really well, there were a lot of questions coming in, which is wonderful, but I know some of them are maybe a little bit more loaded.

So I put some information in the chat for students, and also I put a little plug in for upcoming Skill Builders and for the YouTube channel that has Zin's tutorials that he did on G*Power which would be helpful.

So I'm trying to think of, is there anything else? You know, also too, really quickly, I had a couple students chatting that this was over their heads, they dropped off the webinar.

I know this is an advanced session. Could you just quickly just explain kind of when this G*Power -- when you would start thinking about your G*Power -- using G*Power, the sample size, the effect size, how that would work with the dissertation? That would be later, correct?

>> That would, you know, it would actually be utilized -- [Talking at the same time]
>> Go ahead.

>> Go ahead, Pat.

>> Go ahead.

>> Oh, okay.

G*Power calculations --

>> I was just saying --

[Talking at the same time]

>> Go ahead, Zin.

>> Oh, okay, I'm sorry Pat.

G*Power is -- you would use sample size calculations in

chapter 3 actually.

>> Okay.

>> In your materials and methods.

So be able to say that if these are my research

questions, these are my variables, this is my

statistical test.

This is my, you know, my Alpha, my power.

This is gonna be my effect size.

And then this is my minimum sample size.

And that's where it plays it.
It's the minimum sample size and you report that in chapter 3 in the proposal stage.

>> Wonderful.

Okay, thank you.

Thank you.

I think there was some confusion about when they needed to know all this information and when to bring to their chair, you know?

I know when you're writing your literature review, it's after that.

>> Yeah, I would say it's after your lit review, so you have a good feel for your data and your variables.

And before you're collecting your data.

So you have to have this, you know, before you defend your proposal.

This is gonna be in chapter 3.

I will make a comment.

This is advanced, but effect size is actually discussed in your stats courses as well.

>> Right.

Right.
>> A lot of students on the non-dissertation side, they're working on their assignments, and they're like, you know, and the assignment asks for the effect size.

And they get a little lost. So this applies not only in your dissertation but also when you're taking the, you know, the -- the statistics courses.

>> Right, so they'll hear of effect size.

They'll hear that concept earlier. And -- but later on, they'll actually put it more to use.

>> Yeah, put it to use, absolutely.

>> Right.

So this is more kind of -- so this could also be an introduction kind of what they're going to be needing to know?

>> Right.

So I have to apologize because I have a tutoring appointment in three minutes that I need to get to.

>> Of course.
That's no problem.

>> I think I can address --

>> Yeah, I'll stay on too.

>> Thanks, Zin, so, so much.

>> And thank everybody for coming to today's session

and take care, and I hope to see you again soon.

>> Bye, Zin, thanks, bye.

Pat, I'll stay on as well.

>> Yeah, is there a text we would suggest?

So here's what I would suggest, Sharee, power, sample size, effect size, type one and type two errors, all of those are gonna be addressed in all of your textbooks. What I would suggest is use the text that you're using for your course.

If you're in your dissertation, you know, go back to the text you did use in your courses, and refer to those.

There's probably not a lot of great resources just simply on effect size.

And if there is, you know, you would definitely probably have several pots of coffee at hand to get
through those types of texts because they're gonna be very, very thick.

But every -- every statistical text is gonna refer to this stuff.

>> Yeah, you know, Pat, there was a question about, you know, the -- knowing I guess and what -- as far as the tutorials and our webinars, kind sequence to watch them, you know, to learn.

And I was trying to explain the whole concept is we want to actually build the skill, so we kind of scaffold what we teach.

>> Yep.

>> So I was explaining that, you know, on our skill Builders website, you can look to see for instance -- like what nowhere, what Zin ask doing, this test and means differences so we're starting out with T-tests, for instance.

And then we're kind of moving into, like, ANOVA.

>> Yep.

>> Yeah.
So -- and it -- with statistics, it's hard when you're not really sure about what you're doing, but statistics build on each other as well.

So that's -- that's kind of how we -- I want to let students know that's kind of how we market them.

In the skill building sessions.

So if they go to our Skill Builders page, they can see, even if they scroll way down the bottom and work their way to the top, that's kind of how we have them in zens.

Oh, someone asked a question about do we have a webinar about dummy variables?

Yes, we do.

We're so excited.

That's a hot topic.

We have one coming up.

Yes, that's our next one.

Yes.

>> And it's gonna be with me.

So I better --

>> With Pat, yes.
>> So I better start learning about dummy variables.

>> You're gonna have to start learning about dummy learning, now, it is, and let me -- I can look on our website because I actually just marketed those on our website.

So let me just let students know, they can register.

It's on our registration page.

It's Thursday, September 8th at 7:00 eastern.

So let me just put that in the chat.

This is the link to go to register.

For all of our upcoming Skill Builders.

Zin is doing some great stuff too coming up.

So for September, you guys, we have dummy variables.

We have the second series, the part two of test and mean differences.

This is going to be on the one sample T-test.

Zin did one recently.

And then after that we're doing one on nonparametric methods.

And so -- and then the last one is tests and mean
differences and then we're going into October.

So, everyone, please check our schedule and come back

and visit with us.

And this went well for an hour.

You know, typically, everybody we do 30 minutes.

We used to do 60 minute webinars, and then a lot of
students gave us feedback it was too much information.

So we cut them back.

But today was a lot.

So we did a 60 minute.

So I'm so glad that everybody stuck around with us.

I know, you know, and Pat and you Zin were awesome as
usual.

Students, the recording will be up on our web page
probably I would say by Tuesday or Wednesday.

You'll get the transcript and the recording and
probably the prejudices as well, we'll have that --
presentation as well, we'll have that for you.

>> All right.

I think we got --

>> All right.
>> Most of the questions.

>> Yeah, I think we did.

Oh, somebody asked --

[Talking at the same time]

>> Wendy said my question was not answered.

>> Oh, I'm sorry, Wendy, I forgot about Wendy.

That might be more for a session.

But, Pat, if you want to read her question.

That might be a tutoring session question.

>> Let me find it.

>> It's -- if you scroll up -- yeah, we missed that,

yes, yes.

>> Yeah, I thought Zin was talking -- maybe he was

   talking about a different question.

>> Okay, yeah.

>> What is the -- coefficient analysis?

   Now, so the fie -- Phi coefficient, you're gonna run

   that in SPSS, you're gonna run that with your analysis.

   So the way this works, Wendy is, the G*Power would be

   done in your chapter 3.
It would be done to help you determine your sample size.

The Phi coefficient is gonna be part of your analysis when you run it in SPSS.

But it's -- so, and it will -- it is a determinant of our effect size.

But it's the post hoc version basically.

>> So let's see who had another question.

Is the webinar archived?

Yes.

It's archived, Natasha.

Oh, Sharee asked for a text that has a simple aid.

[Talking at the same time]

>> Your course text.

>> Yes, yeah.

Somebody had a question about SPSS.

And where to get SPSS.

And I had wrote in the chat that you can get that, if you visit the Center for Research Quality, their web page, and if you type it at the top, there's a search parameter, and just type in SPSS.
It'll take you to a link and that link will explain the licensing and how you can download that license and, yes, SPSS is free for Walden students, which is great.

Lessons on G*Power?

Zin has a bunch of tutorials in our Skill Builder YouTube channel.

And I put that in the chat earlier, Richard.

Let's see, if I scroll up, you might find it.

But he has done a whole bunch of stuff on G*Power and he has -- [Talking at the same time]>> I just put the link in the chat.

>> Oh, perfect, thank you.

>> YouTube channel.

>> And this also too, he has done the G*Power tutorials for each, you know, for each different statistical test.

>> The link is a play list, and there are several -- I think there's like eight different little videos on different types of tests using G*Power.

>> Yep.
That sounds good.

>> I think it's a wrap.

>> Yep, yeah, we're 12:05.

And Victor said to please send a reminder.

The student communications, Walden student communications should probably send you an email very shortly.

Usually it's -- I'm sorry, it's about -- goes about a week before the webinar, so you'll get something in your student email.

On what's come up.

Or you can always check our website as well.

Or email me at ASCtutoring@waldenu.edu.

If you have any questions.

Again, I'm the coordinator for the tutoring services program.

And we will be happy to help you.

>> Okay.

I'm gonna stop the recording.

>> Yeah.

>> All right.
>> Richard -- okay, yeah, Richard, I'm sorry, Richard missed the lesson.

Yeah, the Adobe Connect, this is interesting, Pat, I just learned this, that Adobe Connect will send the reminder to whatever time zone they're in.

So if you missed the session, Richard, it's fine.

This was recorded and will be up on our website soon.

>> Yep.

>> All right, everyone, have a great Saturday.

Pat, thanks again.

So, so much.

>> Yep.

>> We had a nice group.

>> We did.

>> Have a great weekend and I'll talk to you over the week.

>> Great.

Thank you.

>> All right.

Enjoy.
Bye, everybody.

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