Episode 45 - Delving into Research Methods

Transcript

When I started my Master's program, one of the classes that stands out was my research methods class. I was encouraged and supported to do something fun and meaningful. In this class, we were given the choice to do a project and focus on either qualitative or quantitative research methods. I love talking to people and thought I could find something fun and interesting to do with a qualitative study. Remember that a qualitative study is more about gaining insights and is descriptive. Kinda more in alignment with storytelling which is my jam. It's less structured and not dependent on statistics. Quantitative research on the other hand is more about collecting numerical data, hard numbers, and looking at measurable information. It's structured and uses statistics. I was in the mood for storytelling and trying to understand more about people. In particular, I wanted to look deeper into language and how language barriers impact people's work, their ability to get a job, and their self-confidence. I didn't do a full study. Maybe I should've but at that stage in my life and education, I just wanted to finish the program and move on to the next thing. I'm sure you can relate but it was a great experience though. I interviewed a lot of people which I found fascinating. Hearing their stories, their experiences, and their perseverance through struggles and challenges was nothing short of inspirational.

Intro

Hey there. In this episode, you're gonna get a review of research studies and designs. In 2024, our profession, the field of dietetics, requires dietitians to have a Master's degree and one of the big differences between a bachelors and Master's degree is an emphasis on research. You might choose to do a project or maybe you'll do a thesis. Either way, research is a factor of any master's program. And to add to that, there's likely gonna be questions on the exam about research. I've had a couple listeners reach out to me requesting a podcast episode on this very topic. So it's a perfect time to go over research studies and designs. Research studies are the backbone of scientific discovery. They give researchers the tools they need to investigate relationships between variables and uncover important insights. But, not all studies are created equal. The design of a study determines how the data is collected, how long the study lasts, and the type of information it can provide. This episode will cover some of the common research study designs that you might be asked on the exam.

But first, it's time for a couple shout outs. Lots of new RD's are joining the RD community so it's a very exciting time. One of the newest members is Ellen Neltner who passed the RD exam. Such an exciting time. She's starting her career in bariatric surgery and medical weight management. Incredible job Ellen. Wishing you so much fun

and growth as a professional in this new career. I also want to give a shout out to Holly Soto. Holly's big into fitness. She would listen to the podcast while training for a half marathon and triathlon. Her goals now that she's a new RD is to expand her nutrition and fitness coaching business. She's also interested in worksite wellness. It's a second career for Holly and I know it wasn't an easy road to get here. Congratulations Holly. Looking forward to seeing where you go in your career. This podcast reviews concepts and helps add that additional element of studying by listening and hearing examples and stories. But as RDs2Be, you do the hard work, all the heavy lifting and I'm so proud of you. I'm really grateful I've been able to create episodes that help make learning fun. So thank you for not only listening but for also trusting me with your stories.

So on that note, let's get started with research studies.

When you read a research article, it's outlined in a way that shows the steps of a research study. There's different types of research studies that we'll go over in this episode but I want to jump right in and start with the steps involved in a research study.

So when planning a research study, first, you need to identify a problem. This is your research topic. You look into the problem further and see what information is out there. You do a review of other research that pertains to your topic that might be similar or help give you ideas on what to consider in your own research. This is often called a Literature Review or for short, people call it a Lit Review. After you've done the lit review, you need to determine a hypothesis which comes from the question you have about the problem. It includes the population you're studying and makes predictions. Here's an example of a hypothesis: Athletes who carbohydrate load before a marathon will have a better marathon time than athletes who do not carbohydrate load. Once you have your hypothesis, you then you need to determine your methods and way you're going to test your hypothesis. After you've conducted the research, you will discuss the findings of your research. It may include a statistical analysis. Often times, research studies will have a section that discusses the limitations of the study. This includes factors that could have influenced the outcomes and things to consider. And then finally a conclusion wraps things up. So that summarizes the main elements of a research study and what's typically included. Before I move on, a helpful tip is to pull up a research article and familiarize yourself with the sections of the paper. You'll see all the elements which really pulls everything together. As a visual learner, this is really helpful for me. At this point in the game, I'm sure you've had many opportunities to analyze research. So try not to get too overwhelmed by these questions if they show up on the exam. You've reviewed numerous research articles to get this far in your academic career. Apply what you've read and seen. You know this information.

Now let's move on and go over different research designs. It varies depending on the type of research you're doing. If you're doing a study that involves human subjects, something to keep in mind is that you need to have approval to move forward with the study. The Institutional Review Board or IRB is a committee that's under the FDA that reviews and approves research involving human subjects. The goal is to make sure the research being conducted is ethical and that the research also follows any federal guidelines that are put in place.

Once all the approvals are complete, the study can proceed. Naturally, if you're doing research that involves humans, you need subjects or participants. These are often randomly selected and have to meet specific criteria. For example, the researchers might be looking at the effect of something (whatever they're testing) on people 50-75 years of age. So all the subjects in the study need to be within that age range. I recently read about a study looking at obesity and the impact of sugar, fat and salt on the brain. In that study, there were obese and non-obese subjects. Both groups got the same nutrition. They then looked at the response in the brain to see if there's a difference in how the brain responds in obese versus non-obese people. In this study, there'd be weight criteria for both groups in order to meet the obese and non-obese criteria. The way researchers recruit subjects could be through media, email lists, college campuses, medical centers, schools…honestly, anywhere. But if there's specific inclusion criteria, it would make sense to recruit in an area where you'll find people who meet the criteria. This still allows for random selection if that's what the researchers are going for because you never know who will sign up, who meet the inclusion criteria and say yes to the terms and conditions of the study.

Usually, in studies, there's a control group and an experimental group. If you're the researcher and you want to see the effect of something on an outcome, you have to have a standard to compare it to. I think of the comparison group as the control group. That group does not get the treatment or therapy or whatever's being tested. The experimental group on the other hand will get the treatment or therapy being tested. Keep in mind the control group might get a placebo. This could be anything that won't affect the outcome of the study. So for example, when my friend Michelle's breast cancer spread to her lungs, she was told there's no cure for her cancer. Instead, they would try to get her enrolled in a study. She would be randomly assigned to either the control or experimental group. The control group would get the standard treatment that's available for people who have lung cancer. They couldn't stop all treatment because that could potentially cause harm. She needed something to at least try and stop the progression of her cancer. The experimental group on the other hand would receive the new treatment being tested that wasn't yet approved as a treatment option for people with lung cancer. Ultimately, the goal and hope for researchers and the subjects is for the experimental group to have improved test results and ultimately find a cure for lung cancer. But with research, that might not be the case. They might find there's no improved outcome. Which is really unfortunate but that's how research works. The

researchers keep trying until they find something that does work. And they might be able to use the research with undesirable outcomes to help them get closer to a cure. So they might build on that research.

Randomized Controlled Trials

Now some research designs are Randomized Controlled Trials which are considered the gold standard in research particularly when evaluating the effectiveness of interventions and treatments. I just gave the example of the study my friend was in for lung cancer treatment. All subjects in that study had to have lung cancer. The control got the standard treatment and the experimental group gets the treatment being tested to see if it could potentially be a new treatment option or even a cure for lung cancer. The subjects are then randomly assigned to either the control or experimental group. By randomly assigning participants into the control or experimental group, researchers can minimize bias and establish a cause-and-effect relationship between the intervention and the outcome. Some studies can also be double-blind meaning both the researcher and the subjects or participants are unaware whether they're in the control or the experimental group. The benefit of double blind studies is that it removes the possibility of bias so the researcher doesn't treat participants differently based on the group they're in. Randomized controlled trials are crucial in advancing medical treatments and interventions.

Before I move on, I want to quickly touch on independent and dependent variables in research designs. The dependent variable is not the variable being manipulated. It's the factor that's being measured or observed. A way to look at it is the dependent variable is the outcome that's expected as a result of the independent variable. It's dependent on the changing variable. The independent variable on the other hand is the variable being manipulated by the researcher. The independent variable is changed to see the impact or effect it has on the dependent variable. So let's go over this using an example that you can relate to since you're studying for the RD Exam. Let's say a researcher wanted to look at the effect study time has on test scores. So we know the two things being looked at are study times and test scores. One of these is the independent variable and the other is the dependent variable. Say the researcher splits people into groups. Group 1 studies for 2 hours, Group 2 studies for 4 hours and Group 3 studies for 6 hours. They all take the same test and the researcher evaluates the exam scores at the end. The factor being manipulated in these 3 groups is the amount of time the subjects get to study. So that's the independent variable. The test scores is the dependent variable. After the study is done, the researcher would then summarize the results of the study to see if increased study time leads to better test scores. So hopefully that helps clarify independent and dependent variables. I feel like questions that have to do with independent and dependent variables pop up on exams often so make sure you're comfortable with independent and dependent variables.

Cohort Studies

Ok. Let's go over cohort studies. Cohort studies can be broken down into different types of cohort studies. I'll cover each of these types of studies in more detail. But first, when thinking of cohort studies, think of it as researching a group of people with something in common. For example, the dietetic interns every year are called a cohort. So each year, a new group or cohort of students enter and complete the dietetic internship. All the students have completed the criteria to become eligible to enter a dietetic internship. They've completed the educational training and they will be eligible to sit for the RD exam at the completion of the dietetic internship. Now iff a study is carried over a long period of time, it's called a longitudinal cohort study. If a study is a retrospective cohort study, it uses data that already exists to analyze and see if there's any relationship between factors. And prospective cohort studies look at future outcomes.

So let me break each of these down a little further. Starting with longitudinal cohort studies. Longitudinal studies are designed to track changes over time and capture the complex connection or relationship between variables. They're particularly useful for studying the long-term impact of certain factors. So here's an example. Remember that with a cohort study, participants share characteristics. With longitudinal cohort studies, the study is carried over a long period of time. Here's a study you might've heard of - The Framingham Heart Study. The goal is to identify risk factors for cardiovascular diseases. Researchers rounded up a bunch of participants and have been following them for decades, collecting data on all sorts of factors like diet, lifestyle, and medical conditions. They're monitoring the progression of disease, identifying behaviors that impact the disease and any risk factors that lead to the development of disease - in this case heart disease. One of the benefits of cohort studies is that they provide valuable insight into the development of diseases and allow researchers to identify risk factors that may influence the outcomes. These can then be used to provide guidelines and recommendations to help keep the population healthy. As with anything, there's challenges with longitudinal studies. For one, it's hard to follow people over many years. They may lose interest in being part of the study, or they might move away and the researchers may lose contact with them. So a longitudinal cohort study is a study that follows a group of people over a long period of time.

Retrospective cohort studies on the other hand are less time consuming. With these type of cohort studies, the researchers look back on data to determine links between factors and outcomes and try to identify the risk factors. For example, there's a lot of interest in looking at length of stay in hospitals because for every day someone is admitted to the hospital, it has cost associated with it. It costs money for the patients and the healthcare system. But more than money, it also has a health cost for the patient because people do best when they're at home. So let's say a particular hospital has a length of stay of 5 days and you want to look at the number of pressure injuries that develop in patients diagnosed with malnutrition who were in the hospital

longer than 5 days. Well, the cohort in this study is patients who were in the hospital longer than 5 days who had malnutrition. Those are the similar characteristics. Then from that data, you would then further review and see of those subjects, how many developed pressure injuries. Then you can further look back and see if there are similarities between those people and potentially preventative measures that can be taken in order to decrease the incidence of pressure injuries in malnourished people. So this would be a retrospective cohort study. The data is already there. You now need to analyze it and see if there's any factors that impacted an outcome.

And finally, let's talk about prospective cohort studies. This type of study is an observational type of research study. Subjects in a prospective cohort study are followed over a specified period of time to investigate the relationship between certain risk factors and the occurrence of disease. So let me give you an example of a prospective cohort study. Say for example, you want to see the impact vaping has on the development of lung disease. The researchers would recruit a group of subjects. They would choose a group of people who are currently vaping and a group that does not. But they want to make sure they don't currently have lung disease. The researchers would put them into two groups. The vaping group and the non-vaping group. The researchers would then follow these individuals over several years, collecting information on their vaping habits, exposure to other potential risk factors for lung disease, and the occurrence of lung disease. They would administer questionnaires, conduct regular check-ups and collect relevant data throughout the study period. After following the participants for a set amount of time, let's say 7 years, the researchers would compare the incidence of lung disease between the two groups - the group that vapes and the group that doesn't. They would analyze the data to determine if there's a statistically significant association between vaping and the development of lung disease.

The key characteristics to keep in mind about a prospective cohort study is that the exposure status, in this case vaping, is identified before the occurrence of the outcome which in this case is lung disease. So it's looking at the exposure and the outcome relationship. By following these participants over time, researchers can collect data on exposure, potential confounding factors, and the development of diseases, allowing them to establish associations. The down side of prospective cohort studies is that they're time consuming. They can be expensive and the subjects can be lost to follow-up. Just like the longitudinal studies. But again, these studies are helpful for public health initiatives and education.

Cross-sectional studies/prevalence

You might be asked on the RD exam about studies that take a snap shot look at one point in time. These studies look at what's happening currently, not in the past or future. They give a glimpse into what's going on. A snap shot view is called a cross-sectional study. For example, researchers may want to look at all the cases of a

specific disease among a group of people at a particular period of time. This type of study can be helpful when time is not available to do a longitudinal study or maybe the researchers don't want that information. They just want to collect information about what's happening right now. Cross-sectional studies are often used to assess the prevalence of certain conditions or behaviors within a population. They're fairly quick and cost-effective but a limitation of this type of study is that it can't show changes over time like other studies can and it can't be used to establish causality. So there's pros and cons to this type of research.

Case control studies

Ok. Let's talk about case control studies. Case control studies look to see if an exposure to a certain factor is associated with an outcome. So the researchers would identify cases who have the outcome and have a control group which are a group of people that do not have the outcome. So let's say researchers want to investigate the association between exposure to a specific medication and the development of Alzheimer's disease. They would recruit two groups - the case group and the control group. The case group is the group of individuals who've been diagnosed with Alzheimer's disease. The control group is the group of individuals without Alzheimer's disease but they're similar to the case group in age, gender, and location. Next the researchers collect information on the participants medical history and exposure to the particular medication. Statistical analysis is used to determine if there is a significant association between the medication and the development of Alzheimer's disease. The participants are not randomly selected. In this study, the participants are selected based on whether or not they have the disease and their exposure to the variable being tested. In the example I used, it would be the specific medication. There are limitations with this type of study. For one, they can only establish association or correlation between exposure and disease. There's recall bias with the cases because even if they were prescribed the medication, there's no data to show they took it in the prescribed amount. There's also selection bias. And there may be some other variables that differ between the cases and the control. These types of studies are helpful in identifying hypotheses and investigating risk factors for disease. From here, the researchers would then want to conduct either a prospective cohort study or if possible, a randomized controlled trial to be able to identify causality.

Survey Research

A type of study you might be familiar with and you might even get information sent to your home is survey research. Survey research is exactly what the title implies. Survey's collect data from people. I get emails from the Academy of Nutrition and Dietetics to participate in survey research. I just got one asking about what topics I'm interested in learning more about. That helps with marketing and creating content and resources that a particular demographic is interested in. So it helps with content creation, education and where an organization should put resources, effort, and time. I don't know about you but whenever I call the cable or internet company,

they ask if I'd like to remain on the line for a brief survey. Usually it's about how likely I am to recommend their services to someone else. Which is very valuable to the company because without customers, there's no business. So these surveys collect data and valuable information from their customers. This type of survey is called Voice of the customer and it's helpful when needing to collect information quickly especially if it's done on the phone. Hospitals collect feedback from their patients once they go home. Some hospitals may use a third party called Press Ganey to get valuable information on how well they're doing and also where they rank in comparison to other hospitals. That information is helpful for facilities to figure out what they can do to improve the patient experience and patient satisfaction. Hospitals are now given a star rating just like hotels. For hospitals, the star rating is based on 5 measures: Mortality, Safety of Care, Readmission, Patient experience, Timely and effective care. So surveys will capture some of this data and provide the information to hospitals so they can make improvements. It can then be incorporated into the Quality Assurance, Performance Improvement or QAPI so all of that data is very helpful in day to day operations and information the manager where they should put their efforts.

Quasi-experimental design

And the last type of study is the quasi-experimental design. Quasi-experiments are similar to experimental design but they lack random assignment of participants into different groups. Remember that with experimental designs, random assignment helps ensure that any observed differences between groups are due to the intervention being studies, rather than pre-existing differences between the groups. In quasi-experimental designs, researchers do not have complete control over the assignment of participants, which limits their ability to establish causality with the same level of confidence as in a true experimental design especially a double-blind experimental designs.

Having said that, researchers can still manipulate an independent variable or treatment and measure its effect on a dependent variable, but they can't randomly assign participants to different groups. One of the reasons researchers would use a quasi-experimental design is when random assignment is not ethical or possible.

It's always easier to make sense of these things with an example or something you can more easily visualize. So here's an example of a quasi-experimental design. A researcher wants to evaluate the impact of a new diet program on weight loss. The researcher recruits participants from two communities: Community 1 and Community 2. Community 1 gets the diet program and they get encouragement to do the program. Community 2 does not get any intervention and is not exposed to the diet program. The researcher collects data such as weight or BMI before and after the implementation of the fitness program. The change in weight and percent body fat over time are the dependent variables. The independent variable is the diet program. So in this

example, Community 1 is the treatment group because they're exposed to the diet program. And Community 2 is the control group because they don't receive any intervention. The researchers compares the weight loss between the two communities to assess the effectiveness of the diet program.

The reason this example shows the difference between this type of research study and a Randomized control trial is because the participants were not randomly assigned to communities and because of this, there might be pre-existing differences between the two communities of participants. Those differences could impact the results. For example, Community 1 might have higher socioeconomic status or might be a group that is more health-conscious. They also might have access to different foods and different grocery stores and more fruits and vegetables. Those differences could have an impact on the outcomes and could limit the ability to truly establish a causal relationship between the diet programs and weight loss. One of the things the researchers could try is to match the participants based on similar characteristics like age, gender, and their baseline weight. They could also collect data on factors such as dietary habits, exercise frequency, attitudes towards health, and the to incorporate this data in the analysis of the results. While the quasi-experimental design might not provide the same level of confidence that a randomized controlled trial can, it still offers valuable information and insights into the effectiveness of interventions in a real-world context when it's not possible to conduct a randomized controlled trial. So it's not the gold standard like the randomized control trial is but it's still a valuable type of experimental design.

Ok. That's a lot of information about research studies and designs. Come back to this episode if you need a refresher.

And remember to stay on top of your study game. There's no limits to achieving the success you so deeply desire. Until next time.