About me

• Undergrad from Rutgers University
• Dietetic internship Allentown campus
• Worked as a Registered Dietitian in sub-acute rehabilitation, LTC, private practice
• Clinical research at Rutgers
• Completing MS in Nutrition at University of Saint Joseph

Contact info
robert.zurfluh@Sodexo.com
Objectives

• **Review**
  • Research Terminology
  • Statistics

• **Practice** finding Peer Reviewed Research

• **Discuss** how to critically evaluate Research

• **Review** PRP Assignment Expectations
Why you should care about research
Why you should care about research

• Dietetics and Nutrition is Science based
• It is a “new” Science
• Clinical practice and standards constantly change
• Need to know research for RD/RDN exam
Some Questions to start us off
What is a hypothesis?
What is a hypothesis?

What does RCT stand for?
What is a hypothesis?

What does RCT stand for?

What does “peer-reviewed” journal mean?
What is a hypothesis?

What does RCT stand for?

What does “peer-reviewed” journal mean?

Can you name some journals?
Types of Research

• Historical
  ✓ Looks at historical sources; examines the past.

• Basic
  ✓ Also known as fundamental or pure research. Increases basic understanding of principles.

• Applied
  ✓ Uses research to examine real world problems through.
    ✓ Randomized Clinical Trials
    ✓ Outcomes Research
Types of Studies Common in Nutrition and Dietetics

- Case Studies
- Case Control Studies
- Cohort Studies (aka longitudinal studies)
- Randomized Controlled Trials
- Double-Blind Method
- Meta-Analysis
- Systematic Reviews

See handout “Understanding Research Study Designs”
Lies, Damned Lies and Statistics - Mark Twain
Basic Statistics

- **Descriptive:** describes characteristics of a sample

- **Measures of Central Tendency:** shows what is the most typical data
  
  - Mean
  - Median
  - Mode
  - Range
Basic Statistics

• Descriptive: describes characteristics of a sample

• Measures of Central Tendency: shows what is the most typical data

  Mean
  Median
  Mode
  Range

Example:
13, 13, 13, 13, 14, 14, 16, 18, 21

Mean = 15
Median = ____
Mode = ____
Range = ____
The standard **normal distribution** has a standard deviation of 1 with a mean of 0.
Most of the times the distribution is not “normal”
Most of the times the distribution is not “normal”

In a Journal article you may see something like this

Fyi:  
1 nmol/l = 0.4 ng/ml  
50 nmol/l = 20 ng/ml
Correlations

Measure of association between two continuous variables—common in nutrition

• **Positive** correlation (+)
  both variables are either high or low

• **Negative** correlation (-)
  one variable is high and the other is low

• **No correlation**
  no linear association between variables
Correlations

Measure of association between two continuous variables—common in nutrition

- **Positive** correlation (+)
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- **No correlation**
  no linear association between variables
Correlation Strength

The strength of a correlation is measured by the correlation coefficient \( r \)

- Perfect correlation = 1
- Range: -1 to +1
- The closer \( r \) is to -1 or +1, the stronger the correlation
- The closer \( r \) is to 0, the weaker the correlation
Correlation Strength

The strength of a correlation is measured by the correlation coefficient $r$

- Perfect correlation = 1
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- The closer $r$ is to -1 or +1, the stronger the correlation
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Correlation does not Imply Causation
Correlation does not Imply Causation

Recent survey shows that 100% of people who drink water die.
That’s a fact.
Correlation does not imply causation.

The Real Cause of Polio!

Polio Rates / Ice Cream Sales 1949

In the late 1940s, before there was a polio vaccine, public health experts in America noted that polio cases increased in step with the consumption of ice cream and soft drinks. Eliminating such treats was even recommended as part of an anti-polio diet. It turned out that polio outbreaks were most common in the hot months of summer, when people naturally ate more ice cream, showing only an association.


* Ice cream sales for illustration purposes only
Studies can be used to make inferences (predictions) about a population based on a study sample.
Inferential Statistics

For example:
Q: Do dietetic interns smoke cigarettes?
Statisticians have countless ways to analyze data.

You may have learned about student t-test, ANOVA, and significance in your undergrad.

Other terms commonly encountered include Chi Square, Spearman’s rank, Statistical Power, t-score, Tukey’s test of significance, Z-score, ...
Statisticians have countless ways to analyze data.

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Other terms commonly encountered include Chi Square, Spearman’s rank, Statistical Power, t-score, Tukey’s test of significance, Z-score, ...

You do not need to know any of these, except...
Statistical Significance (p-value)

If you remember one thing from this class, make sure you understand the p-value

- Usually p of less than 0.05 means there is statistically significant difference
- p is a measure of probability / chance. A p-value of < 0.05 means that the difference between the groups due to chance would be observed less than 5 out of 100 times (less than 5%).
Statistical Significance (p-value)

For example, would you expect/want $p < 0.05$ (less than) or is $p > 0.05$ (greater than)?

You design a study with 2 groups of adult volunteers looking at how fish oil supplements affect blood lipids. You randomly divide the study volunteers up into 2 groups (one group will receive fish oils, another group a placebo) and run statistics to make sure they are evenly distributed for age, baseline triglyceride levels, BMI, exercise habits, etc.

What do you want $p$ to be? Why?
Table 1 Baseline information of study subjects (percent or mean ± standard deviation)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Placebo group</th>
<th>Omega-3 group</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>Age (years)</td>
<td>20.4 ± 2.1</td>
<td>21.4 ± 2.9</td>
</tr>
<tr>
<td>Female</td>
<td>38%</td>
<td>48%</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>27.9 ± 2.9</td>
<td>28.5 ± 3.3</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td>125 ± 7</td>
<td>124.5 ± 7</td>
</tr>
<tr>
<td>Waist circumference, females (cm)</td>
<td>86 ± 10</td>
<td>90 ± 11</td>
</tr>
<tr>
<td>Waist circumference, males (cm)</td>
<td>92 ± 8</td>
<td>96 ± 6</td>
</tr>
<tr>
<td>Triglycerides (mmol/L)</td>
<td>1.01 ± 0.56</td>
<td>1.01 ± 0.52</td>
</tr>
<tr>
<td>HDL-cholesterol (mmol/L)</td>
<td>1.22 ± 0.32</td>
<td>1.20 ± 0.26</td>
</tr>
<tr>
<td>Serum glucose (mmol/L)</td>
<td>4.7 ± 0.4</td>
<td>4.7 ± 0.4</td>
</tr>
<tr>
<td>Activity level (number times exercise per week)</td>
<td>3.0 ± 0.9</td>
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<tr>
<td>Current Smokers</td>
<td>25%</td>
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* None of the groups were statistically significantly different at p < 0.05.
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* None of the groups were statistically significantly different at p < 0.05.
Statistical Significance (p-value)

That was for your 2 volunteer groups, but what about the results of your study?

Let’s say your study measures fatty acids in the red blood cell phospholipid bilayer of the study participants.

What do you want p to be for the results between the placebo group and the treatment group? Why?
### Table 2: Effect of fish oil supplementation on plasma and red blood cell phospholipid fatty acids*

<table>
<thead>
<tr>
<th>Markers</th>
<th>Placebo Before</th>
<th>Placebo After</th>
<th>Omega-3 Before</th>
<th>Omega-3 After</th>
<th>Treatment difference</th>
<th>S.E. of difference</th>
<th>P-value of difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasma PL% EPA</td>
<td>0.332</td>
<td>0.400</td>
<td>0.329</td>
<td>1.225</td>
<td>+0.832</td>
<td>0.170</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Plasma PL% DHA</td>
<td>1.623</td>
<td>1.370</td>
<td>1.618</td>
<td>2.157</td>
<td>+0.762</td>
<td>0.281</td>
<td>p = 0.008</td>
</tr>
<tr>
<td>Plasma PL% EPA&amp;DHA</td>
<td>1.95</td>
<td>1.77</td>
<td>1.95</td>
<td>3.38</td>
<td>+1.61</td>
<td>0.408</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>RBC% EPA</td>
<td>0.314</td>
<td>0.373</td>
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<td>3.169</td>
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<td>+0.708</td>
<td>0.245</td>
<td>p = 0.019</td>
</tr>
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<td>RBC% EPA&amp;DHA</td>
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<td>3.455</td>
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<td>5.195</td>
<td>+1.314</td>
<td>0.298</td>
<td>p = 0.002</td>
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* Repeated measure general linear models. PL = phospholipid, EPA = eicosapentaenoic acid, DHA = docosahexaenoic acid.
Statistical Significance (p-value)

Table 2 Effect of fish oil supplementation on plasma and red blood cell phospholipid fatty acids*

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* Repeated measure general linear models. PL = phospholipid, EPA = eicosapentaenoic acid, DHA = docosahexaenoic acid.

All are well below 0.05 (p<0.05), meaning the before and after measurements are significantly different.
Statistical Significance (p-value)

One more results slide. What does this tell us?

Table 3 Effect of fish oil supplementation on arterial measures*

<table>
<thead>
<tr>
<th>Markers</th>
<th>Placebo</th>
<th>Omega-3</th>
<th>Treatment difference</th>
<th>S.E. of difference</th>
<th>P-value of difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
<td></td>
</tr>
<tr>
<td>Aortic systolic blood pressure (mmHg)</td>
<td>112.1</td>
<td>110.0</td>
<td>110.8</td>
<td>111.1</td>
<td>+2.54</td>
</tr>
<tr>
<td>Central PWV (m/s)</td>
<td>7.44</td>
<td>6.61</td>
<td>7.49</td>
<td>7.43</td>
<td>+0.76</td>
</tr>
<tr>
<td>Augmentation Index (%)</td>
<td>10.8</td>
<td>7.4</td>
<td>10.9</td>
<td>11.6</td>
<td>+4.00</td>
</tr>
<tr>
<td>SBP (mmHg)</td>
<td>125.7</td>
<td>124.5</td>
<td>124.5</td>
<td>125.1</td>
<td>+1.9</td>
</tr>
<tr>
<td>LDL cholesterol (mmol/L)</td>
<td>2.41</td>
<td>2.39</td>
<td>2.47</td>
<td>2.48</td>
<td>-0.01</td>
</tr>
<tr>
<td>Triglycerides (mmol/L)</td>
<td>0.88</td>
<td>0.99</td>
<td>0.91</td>
<td>0.91</td>
<td>-0.099</td>
</tr>
<tr>
<td>HDL-cholesterol (mmol/L)</td>
<td>1.225</td>
<td>1.164</td>
<td>1.204</td>
<td>1.189</td>
<td>+0.004</td>
</tr>
<tr>
<td>TNF-α (pg/mL)</td>
<td>4.90</td>
<td>4.52</td>
<td>5.31</td>
<td>5.70</td>
<td>+0.14</td>
</tr>
<tr>
<td>IL-6 (pg/mL)</td>
<td>0.87</td>
<td>0.77</td>
<td>0.99</td>
<td>1.12</td>
<td>+0.21</td>
</tr>
<tr>
<td>CRP (nmol/L)</td>
<td>20.7</td>
<td>21.8</td>
<td>17.3</td>
<td>18.7</td>
<td>+0.12</td>
</tr>
</tbody>
</table>

* Repeated measure general linear models. PWV = Central pulse wave velocity, BMI = Body Mass Index, SBP = Systolic Blood Pressure. TNF-α = Tumor Necrosis Factor-α, IL-6 = Interleukin-6, CRP = C - reactive protein. Triglycerides, TNF-α, IL-6, and CRP are log transformed; means expressed as geometric means; differences are expressed as log values.
Does statistical significance mean clinical significance?
Let’s watch a Ted Talk
Take a 5-minute break
Practice finding Peer Reviewed Research

On your website under Resources we have some links to sites helping you with finding papers.
Practice finding Peer Reviewed Research

Let search online for _____________ and _______________

using ...

PubMed and Google Scholar
## Sections typically found in a Research Paper

<table>
<thead>
<tr>
<th>Section</th>
</tr>
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<tbody>
<tr>
<td>Title</td>
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<tr>
<td>Abstract</td>
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<tr>
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<tr>
<td>Results</td>
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<td>Discussion</td>
</tr>
<tr>
<td>Acknowledgements</td>
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<td>Literature Cited</td>
</tr>
<tr>
<td>Appendices</td>
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</table>
**Sections typically found in a Research Paper**

<table>
<thead>
<tr>
<th>Section</th>
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</tr>
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<tbody>
<tr>
<td>Title</td>
<td>Describes the study one sentence.</td>
</tr>
<tr>
<td>Abstract</td>
<td>The 1-minute summary.</td>
</tr>
<tr>
<td>Introduction</td>
<td>Background (what is known) and hypothesis.</td>
</tr>
<tr>
<td>Methods</td>
<td>All the things that had to be done. Includes the population studied and maybe detailed info how an RD/RDN was involved or how nutrition information was collected.</td>
</tr>
<tr>
<td>Results</td>
<td>Results (the researchers want to share). Often the section with most tables and graphs.</td>
</tr>
<tr>
<td>Discussion</td>
<td>What does it all mean? Often includes a Conclusion.</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>If not listed as an author, a good place to thank others involved.</td>
</tr>
<tr>
<td>Literature Cited</td>
<td>References used to create study and write paper.</td>
</tr>
<tr>
<td>Appendix</td>
<td>Optional additional information. Also, look for funding sources in the paper. Studies are expensive, who provided the $$$$ ?</td>
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Read the Paper critically

A few (of many) questions to keep in mind while reading peer-reviewed journal articles

✓
✓
✓
✓
✓
✓
Read the Paper critically

A few (of many) questions to keep in mind while reading peer-reviewed journal articles

✓ How recent is the study, and what was the population? (is it applicable to the US?)
✓ Who funded the study?
✓ Could someone else re-create it using the Methods (and Materials) section?
✓ Were the results easy to understand or confusing?
✓ What were the limitations of the study mentioned? Were there other ones not mentioned?
One more Question Researchers ask:
When reading an article the question comes up if this peer-reviewed published study is valid and reliable?

Validity
✓ a test’s ability to measure what it is supposed to measure
  • Accuracy
    quantitative measure of the validity of the test

Reliability
✓ reproducibility of test results
  • Precision
    quantitative measure of reliability
Your PRP assignment

Find it under
Core Assignments
Clinical Rotations
General Clinical

Professional Research Presentation (PRP):
You will choose a dietetics-related topic that is of interest to you and your preceptors. You will research the topic, present it to Registered Dietitians for continuing professional education units (CPEUs) using the CPEU Application, get feedback from your audience using the Presentation Evaluation form and submit a Summary Evaluation of Experience by the due date. Start this assignment by reading through the PRP Guidelines first.

Due Date: see PRP Guidelines and Assignment Checklist for specific due dates.

Note: Use the research article (pdf below) as a reference when completing this project.

Basic Statistics in Nutrition Research
Download File
The three main parts in a nutshell

• Development of a written report
  • Choose a topic with your preceptors.
  • Find research no older than 5 years.
  • Write a paper 8-12 pages double spaced.

• Development and execution of a PowerPoint presentation
  • A professional presentation – given to professionals by a professional.
  • Expect to present for a minimum of 30 minutes.
  • After presentation: collect feedback using the Presentation Evaluation.
  • After presentation: complete Summary Evaluation of Experience.

• Apply for one CPEU
  • Apply for one CPEU well ahead of presentation to get Certificates for your audience.
General Checklist and Deadlines
--- Check Assignment Checklist for campus specific info ---

Prior to giving to your presentation

____ Topic sent for approval early on
____ Date / time / room secured
____ Rough draft of paper submitted (2 weeks before presentation)
____ Final draft of paper submitted
____ Presentation PPT outline and draft submitted (2 weeks before presentation)
____ Final Presentation PPT sent submitted
____ if applicable, send copy of any handouts created
____ CPEU Application filled out and sent back to your campus director
  (due 2 weeks before presentation)
General Checklist and Deadlines
--- Check Assignment Checklist for campus specific info ---

**During and after your presentation**

- [ ] Presented in a professional manner (this is a professional presentation)
- [ ] Use of appropriate audio-visuals to enhance presentation
- [ ] Information is accurate and up to date
- [ ] Summary evaluation of experience turned in within one week of presentation
- [ ] At least one presentation evaluation turned in within one week of presentation