Nursing Journal Toolkit: Critiquing a Quantitative Research Article

1. Guidelines for Critiquing a Quantitative Research Article for the Journal Club
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## Guidelines for Critiquing a Quantitative Research Article for the Journal Club

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is the title representative of the research report?</td>
<td>Yes/No/Maybe?</td>
<td></td>
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<tr>
<td>2. Does the introduction state the problem and address its significance to nursing?</td>
<td>Yes/No/Maybe?</td>
<td></td>
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<tr>
<td>3. Is the review of the literature thorough and reflect critical analysis?</td>
<td>Yes/No/Maybe?</td>
<td></td>
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<tr>
<td>4. Are the research questions and hypotheses clearly written?</td>
<td>Yes/No/Maybe?</td>
<td></td>
</tr>
<tr>
<td>5. Are the independent and dependent variables identified?</td>
<td>Yes/No/Maybe?</td>
<td></td>
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<tr>
<td>6. Was a methodological design described?</td>
<td>Yes/No/Maybe?</td>
<td></td>
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<tr>
<td>7. Was the setting used to collect the data described?</td>
<td>Yes/No/Maybe?</td>
<td></td>
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<tr>
<td>8. Are the population and the sample under study clearly described?</td>
<td>Yes/No/Maybe?</td>
<td></td>
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<tr>
<td>9. Is the sample size described with support for sufficient size (i.e. rationale or power analysis)?</td>
<td>Yes/No/Maybe?</td>
<td></td>
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<tr>
<td>10. Were instruments or physiologic tools / measures used to measure variables described?</td>
<td>Yes/No/Maybe?</td>
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</tr>
<tr>
<td>11. Is support for the reliability and validity of measurement instruments described?</td>
<td>Yes/No/Maybe?</td>
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<tr>
<td>12. Was the research protocol clearly described?</td>
<td>Yes/No/Maybe?</td>
<td></td>
</tr>
<tr>
<td>13. Was information about the data analysis provided?</td>
<td>Yes/No/Maybe?</td>
<td></td>
</tr>
<tr>
<td>14. Are the statistical tests appropriate for the study design (Do they provide)</td>
<td>Yes/No/Maybe?</td>
<td></td>
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<tr>
<td>information to answer the research questions / hypotheses)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Are the results of the study described?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>16. Are the limitations of the study discussed?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>17. Does the discussion section match the results of the study? (Does it include a discussion of the results as they relate to the research questions / hypotheses and the relationship to other published studies?)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>18. Are implications for nursing practice discussed?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>19. Are implications for nursing research discussed?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>20. Will you be able to apply the results from this study to your patient care?</td>
<td>Yes</td>
<td>No</td>
</tr>
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</table>
### Critical Appraisal of Scientific Literature: Guide to Statistical Tests

<table>
<thead>
<tr>
<th>Common Statistical Terms/Tests</th>
<th>What it is used for</th>
<th>Level of measurement and expression of data</th>
<th>Names it may be called</th>
<th>Interpretation</th>
</tr>
</thead>
</table>
| **P Value** *p*               | • Tells whether the differences in the test statistics are real (does not tell whether findings are important or applicable) | NA | • P value | • A small *p* value indicates that findings are not due to sampling error  
• Significant *p* values are dictated by the alpha defined by the researcher; most studies use an alpha of .05 (a *p* value < .05 would be significant) |
| **Chi-square** $\chi^2$     | • Test of independence (difference) of 2 samples  
• Test of goodness of fit of a single sample and a known population value  
• Test of an association between 2 variables in 1 sample | Level of measurement  
• Nominal (categorical)  
• Ordinal (categorical)  
• Binominal (categorical)  

Expressed as  
• Percentages  
• Frequencies  
• Proportions  
• Rates | • Pearson chi-square  
• Fischer’s exact test  
• Likelihood ratio  
• Cross-tabs  
• Mantel-Haenszel | • Large $\chi^2$ values usually indicate a difference in values or an association between variables  
• Confirm significance of *p* value (*p* < .05) |
<table>
<thead>
<tr>
<th>Common Statistical Terms/Tests</th>
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<tbody>
<tr>
<td>t test ( t )</td>
<td>• Tests for a difference between 2 group means in either independent, related samples, or paired samples</td>
<td>Level of measurement • Dependent variable is continuous (interval/ratio) Expressed as • Mean scores</td>
<td>• Student’s t-test • Independent sample t-test • Paired t-test</td>
<td>• Large ( t ) value usually indicates significant difference between groups; however, significance depends on sample size too • Confirm associated ( p ) value (( p &lt; .05 )) for statistical significance</td>
</tr>
<tr>
<td>Analysis of Variance ( F )</td>
<td>• Tests for a difference between more than 2 groups of means</td>
<td>Level of measurement • Independent variables are categorical (nominal, ordinal, binomial) • Dependent variable is continuous (ratio/interval) Expressed as • Mean scores</td>
<td>• ANOVA • F test</td>
<td>• Large ( F ) values usually indicate significant differences between groups; however, significance is also dependent on sample size • Confirm associated ( p ) value (( p &lt; .05 )) for statistical significance</td>
</tr>
<tr>
<td>Alpha coefficient ( \alpha )</td>
<td>• Test of internal reliability of a measurement instrument</td>
<td>NA</td>
<td>• Cronbach’s alpha • Internal alpha • Internal reliability</td>
<td>• &gt;.7 is desirable • &gt;.9 suggests strong reliability</td>
</tr>
<tr>
<td>Common Statistical Terms/Tests</td>
<td>What it is used for</td>
<td>Level of measurement and expression of data</td>
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<td>-------------------------------</td>
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<tr>
<td>Correlation coefficient $p$, $r$ or $\rho$</td>
<td>• Descriptive measure of the strength and direction of a relationship between 2 variables in a sample</td>
<td>Level of measurement • Pearson’s product moment correlation for continuous variables • Spearman’s rank for categorical variables</td>
<td>• Pearson’s product moment correlation • Spearman’s rank</td>
<td>• A negative value indicates an inverse relationship • A positive value indicates a positive relationship • $.7$ indicates a relationship exists • $.9$ indicates a strong relationship exists</td>
</tr>
</tbody>
</table>
Tips/Guidelines for Critiquing a Quantitative Research Article for the Journal Club

1. Is the title representative of the research report?
   • Do you understand from the title the focus of the study?
     ▪ Variable(s) of interest (what was studied)
     ▪ Population studied (who)
     ▪ Setting of the study (where)

2. Does the introduction state the problem and address its significance to nursing?
   • Do you understand why the researchers were driven to pursue a scientific investigation of the problem? They should not only provide a statement of the problem, but include statistical data or references to validate it.

3. Is the review of the literature thorough and reflect critical analysis?
   • You know the literature review was thorough if
     ▪ Articles are described logically so you are able to follow their trend of thought that led to the research question/hypothesis.
     ▪ If you get to the research question/hypothesis and don’t understand how the author(s) got there – it wasn’t thorough. The literature review should define the knowledge gap – where the research should be directed.
   • Reviewing reference list
     ▪ References should be within the last 5 years unless
       1. The author is listing their work on this subject (their program of research) over several years.
       2. Primary sources of evidence – landmark or foundational studies that led to others investigating a particular topic. These are the references that everyone publishing in a particular topic includes.
     ▪ Review reference list for the types of journals that articles were cited from
       3. Nursing journals
       4. Allied health journals
       5. Medical journals
       6. Other disciplines (ie. business, economics)
   • Critical analysis
     ▪ Did the author provide specific information about the research investigation from articles cited rather than a conclusion of the
research? Critical analysis of articles in the literature review usually includes information such as:
1. type of design
2. population of interest, sample size
3. statistical findings

4. What are the research questions and/or hypotheses and are they clearly written?
   • Research questions may or may not be explicitly stated – they are always there!
     ▪ They may be implied in the purpose statement.
   • Not all studies have hypotheses, such as in descriptive studies. There must be sufficient scientific evidence in order to formulate a hypothesis.
     ▪ A hypothesis (1) specifies the variables (factors expected to impact outcome) to be manipulated or measured (based on previous research), (2) identifies the population to be examined, and (3) indicates the type of research.

5. Are the independent and dependent variables identified?
   • Not all studies have independent and dependent variables.
   • Dependent variable – the variable(s) (outcome) that results from the influence of other variables.
   • Independent variable – the variable(s) that influences the outcome of another variable(s)
   • Example – Blood glucose level (Dependent variable); D5W IV infusion (Independent variable)

6. Was a methodological design described?
   • Methodological design refers to the type of procedures used in completing the study.
   • Types of design include:
     ▪ Descriptive – designed to gain more information about variables within a particular field of study
     ▪ Correlational – examines relationships between variables
     ▪ Quasi-experimental – manipulation of a variable without randomization
     ▪ Experimental – manipulation of a variable with randomization
   • The type of design used should be based on the research question/hypotheses. Is the study design the only design that would answer the research question or test the hypothesis?
• Could another type of design answered the research question or tested the hypothesis?

7. Was the setting used to collect data described?
   • Where (i.e. hospital, clinic, community, school) was the study conducted?
   • Is the setting where the study was completed similar to ours?
   • If not, are there any similarities in the setting that may apply to ours?

8. Are the population and the sample under study clearly described?
   • Is the “Who” that is being investigated identified? The population is the larger group from which the sample is taken. The sample should be representative of the population
   • Were inclusion and exclusion criteria for the sample described?

9. Is the sample size described with support for sufficient size?
   • Is the sample size sufficiently large to generalize the results of the study?
     ▪ Was a power analysis described? For example: A total of 220 subjects are required (74 each group) to achieve moderate effect size of 0.3, Alpha of 0.05 with 95% power.
     ▪ Estimation of proportion of condition (i.e. incidence of disorder)?
     ▪ Was a rationale for the sample size described?
   • The largest sample size possible is best.
   • Consider the sample size relative to the population (For example: 15 subjects would probably be sufficient if the entire population was 30)

10. Were instruments or physiologic tools / measures used to measure the variables described?
    • Anything used to collect data is an instrument.
    • Demographic data forms, surveys, questionnaires, thermometers, sphygmomanometer, glucometers are all types of data collection instruments.

11. Is support for the reliability and validity of measurement instruments described?
    • Does the author include a statement that the instruments are reliable and valid?
    • Does the author include psychometric data to reflect reliability and validity?
      ▪ Reliability
        ▪ Internal consistency reliability or Cronbach’s alpha (α)
- Inter-rater reliability
- Validity
  - Face & content validity (statement that experts reviewed the instrument)
    - May include a statement about Content Validity Index
  - Factor analysis
  - Construct validity
- The author may not make any statements about instruments that are generally accepted as reliable and valid (i.e. thermometer, Beck’s depression scale, CRIES, Baker-Wong Faces pain scale)

12. Was the research protocol clearly described?

- Was the study (research design, sampling procedure, data collection procedures, human subject protection, and data analyses) described in sufficient detail that you could replicate the study without speaking with the researchers?

13. Was information about the data analysis provided?

- What statistical tests were used to analyze the data?

14. Are the statistical tests appropriate for the study design?

- Do the statistical tests provide information that answers the research questions / hypotheses?
- Was the statistical test that was chosen
  a. appropriate for the design?
  b. appropriate for the type of data collected?
  c. appropriate for the level of measurement?

15. Are the results of the study described?

- What results (demographics of sample, results from statistical tests) are reported?

16. Are the limitations of the study discussed?
• Are limitations (sample size, representativeness of the sample, reliability & validity of measurement instruments, time to complete the study, data collection procedures, experience of researchers, etc.) discussed?
• Can you identify limitations of the study design that were not discussed?

17. Does the discussion section match the results of the study?
   • Are the results discussed in relationship to the research questions or hypotheses?
   • Are the results discussed / compared to the results from studies discussed in the literature review?

18. Are implications for nursing practice discussed?
   • Does the research report state implications for
     a. nursing practice?
     b. nursing education?
     c. nursing administration?
   • Can you think of any other implications?

19. Are the implications for nursing research discussed?
   • Does the research report state implications for future research?
   • Can you think of any implications for nursing research?

20. Will you apply the results from this study to your patient care?
   • Can the findings be generalized to your practice area?
   • Will a practice change be in alignment with patient / family values /preferences?
   • What level of evidence does this study represent?
   • Is additional scientific evidence necessary before piloting a practice change?
Journal Club Summary

<table>
<thead>
<tr>
<th>Reference:</th>
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<tr>
<th>Brief Abstract or Attach Article:</th>
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<tr>
<th>Review of Critique:</th>
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<table>
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<tr>
<th>Following critical analysis of the article using the critique instrument, are the results of the study valid?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can the findings of the study be applied to your patient population?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<th>COMMENTS (if applicable):</th>
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<th>CONCLUSION (Yes to only one option):</th>
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<tr>
<th>Additional articles addressing this topic warranted?</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>Progress to EBP pathway to pilot practice change?</td>
<td>Yes</td>
<td>No</td>
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<td>Progress to Research pathway?</td>
<td>Yes</td>
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