Research Methods: Evaluating Summaries of Popular Media Research Reports

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Abstract:

This study examined undergraduate students' ability to evaluate research reports presented in popular media and whether repeated practice improved students' evaluation ability. Data were collected during two different semesters from students enrolled in a psychology research methods class. Students were presented with five summaries of research studies. For each study, students answered six questions evaluating the research design and the types of conclusions that could be made. Students also engaged in small group discussions about the research. The percentage of students who correctly answered each question showed an increase with repeated practice, and by the end of the semester students were better able to explain their answers in writing. Areas where students need further assistance in order to think critically about research were identified, such as the implications of making causal inferences beyond the context of the specific study.

Key Words:

Scholarship of teaching and learning, Research evaluation, Popular media, Correlation versus causation.

Motivation for the Project

Each semester, I teach Research Methods, a one-semester undergraduate course that emphasizes non-experimental research methodology used in psychology. Students are either Psychology majors or minors and typically in their junior year. The content in this course is often students' first formal exposure to the research process. By the end of the semester, students generally have a good grasp of the basics of non-experimental research. For example, they read research studies and identify relevant

information (hypotheses, variables, etc.), as well as read research studies related to a specific research topic and write a synthesis of the literature. Students are also generally able to discuss strengths and weaknesses of specific types of research methodologies (e.g., survey, observation, etc.). But during our class discussions of research, I noticed that students would often have misrepresentations of research that were coming from their exposure to popular media and report something they had heard on the news or read on a news website. For example, students will often make statements such as sugar causes Attention-Deficit Hyperactivity Disorder, eating before bedtime causes weight gain, being abused as a child causes a parent to abuse his/her own children, and vaccinations cause autism. One of the biggest misconceptions students often make is attributing causal relationships when no causality is reported in the original studies. I was interested in examining how well students were able to evaluate research summaries presented in the popular media.

The distinction between causality and non-causality in research is a central concept in research methodology. The type of research design that is used decides the type of relationship that exists between the variables (Miller, Chaplin, & Coombs, 1990). An experimental design, where variables are manipulated and elements of control are essential in order to rule out other possible causal factors, is used to determine causal relationships between variables, whereas correlational designs merely establish relationships between variables and do not allow for causal inferences to be made.

The misinterpretation of causation from correlational studies could have detrimental consequences. For example, a correlation between increased vitamin E intake and a decreased risk of coronary heart disease has been found in both men (Rimm et al., 1993) and women (Stampfer et al., 1993). Since heart disease is the leading cause of death for both men and women (Heron et al., 2009), there is a great deal of focus on prevention. Individuals who interpret this correlation as a causal relationship may increase their intake of vitamin E in an attempt to ward off heart disease. However, high consumption of vitamin E, especially in the form of supplements rather than through dietary means, has been associated with an increased risk of cataract formation (ODS, 2009), hemorrhagic stroke (Schurks et al., 2010), various drug interactions (ODS, 2009), and a risk of birth defects among pregnant women (Smedts, 2009), so it is possible that these individuals might actually be doing more harm than good by increasing their vitamin E intake.

For this project, I examined how students were evaluating research that was presented in the popular media and the kinds of conclusions that they drew from it. Since the majority of our students do not go on to graduate school in psychology and are not going to be researchers, one of my goals in the course is help students become good consumers of research—that is, to be able to read research that is presented in the popular media, to think critically about it, and to evaluate it. I hope that based on their understanding of research methods that students can read a report of a research study and be able to make decisions that are relevant for their lives, such as deciding whether to engage in a certain health-related behaviors.

My first attempt to examine students' understanding of research reports was to give students a recent research report from a popular news website (news.yahoo.com) and to discuss it as a class. Only a few of the students were able to correctly infer that the

researchers could not accurately make causal statements about the variables because a correlational design was used. Most of the students focused on sample size (e.g., there were only 112 participants) or that the sample came from a particular demographic (e.g., only adolescents were studied). Because most of the students struggled with this, I decided to look at student understanding in a more systematic way and to give students both individual and small group practice at evaluating the kinds of research that they would encounter in the popular media.

I chose to use research reports that were presented in the popular media rather than to use empirical articles from psychology journals because popular media tends to be a frequent source of scientific research for people (Beins, 2004). For example, Jarvis, Stroud, and Gilliland (2009) found that college students access news that is convenient, namely news from the Web and cable television. Therefore, it becomes crucial to help students become good consumers of research, especially from non-primary sources. Halpern (1999) suggests that students may be able to articulate correctly why correlation does not equal causation but not be able to apply this knowledge in the context of actual research. Many major newspapers highlight research studies on a frequent basis, and according to Utts (2002), "most citizens, even many reporters, do not have the basis to read them critically" (p. 1). Given the potential consequences of misinterpreting results, it is important to help students to be able to evaluate such studies.

The literature is replete with scholarly articles that have focused on teaching activities to assist students to evaluate research. For example, Varnhagen and Digdon (2002) describe a Web-based discussion activity that focused on empirical reports published in psychological journals, Ganong and Coleman (1993) examined the efficacy of three different methods for assisting graduate students in critiquing family research, and Sternberg (1999) presented different activities to help students focus on research questions and producing research. However, only a few studies have focused specifically on research reports that are presented in the popular press. Connor-Greene (1993; Connor-Green & Green, 2002) has described two different activities to teach critical evaluation of Internet and press reports of research. Connor-Greene (1993) found that in small discussion groups, students could identify flaws in an empirical study and identify misrepresentations of the study from the newspaper account of that study. Connor-Greene and Greene (2002) found that while only a small percentage of students could cite problems with an article from an Internet site, all small-groups during the discussion phase of the assignment could generate possible problems. However, both of Connor-Greene's activities are one-class-period discussion activities with a follow-up individual assignment, and do not involve multiple efforts to increase students' abilities. Because the majority of undergraduate students are probably going to get their scientific research from popular media, especially Internet sites, I decided that my students could probably benefit from repeated practice with evaluating such information, especially since many details of the research process are not included in popular media summaries. In addition, Connor-Greene's work suggests that small group discussion is beneficial for students in this context.

The Research Questions

- Can students accurately evaluate research summaries that are presented in the popular media?
- Does repeated individual practice and small group discussion improve students' ability to evaluate popular media research summaries?

Study 1 -- Fall 2008

Sixteen undergraduate students, mainly juniors and seniors enrolled in Research Methods, participated. This is one of the foundational courses for our psychology majors and minors. In the context of learning about different research methodologies, students design two different types of non-experimental research projects during the semester, collect, and analyze data. The first project is a naturalistic observation study. In the second project, a survey study, students are also required to find and read related empirical journal articles, and to write a literature review that synthesizes the research.

Assignments

Students completed five individual assignments where they were given a summary of a research study from the popular media to evaluate. These assignments were spaced approximately 3-4 weeks apart. After individual assignment 2 and 4, students participated in a small group activity where they had to design a study to examine an alternative explanation for research summary 2 and 4, respectively.
Each assignment was a summary of an actual study that was either found on a popular Internet news source (news.yahoo.com or cnn.com) with the quotes from the researchers removed or was written as if it appeared from such a source. All studies were correlational designs.

Example Research Summary

An example of one of the individual assignments was a summary of research by Buijsse, Feskens, Kok, and Kromhout (2006) that appeared in the health section of news.yahoo.com on February 28, 2006:

Recently (Feb. 2006), Buijsse and his colleagues in The Netherlands used data from the Zutphen Elderly Study, which began collecting data in 1985 on Dutch men who were ages 65 and older. In this study, the eating habits of 470 men who were not taking blood pressure medication were examined. Researchers found that men who ate the equivalent of about 10 grams of chocolate a day – including cocoa drinks, chocolate bars, and chocolate pudding – [this amount is equivalent to about 1/3 of a chocolate bar] had lower blood pressure and a 50 percent lower risk of death compared to those men who ate no chocolate or less than 10 grams a day. Researchers concluded that the relationship between chocolate and lower blood pressure was found because cocoa beans contain flavanols, which are thought to increase nitric oxide in the blood and improve the function of blood vessels.

Students were presented with four other summaries that followed the same format as above. For each research summary, students were asked to evaluate each study by answering the following questions:

1. What type of research design (experiment or correlation) was used in this study? Explain your answer.
2. Can the researchers conclude that (variable A) causes (variable B)? Explain your answer.
3. What was the researchers' explanation for their findings?
4. What is an alternative explanation for the findings?
5. Describe a potential problem in this study.
6. Based on the findings, do you think that researchers can make recommendations to engage in (variable A) in order to decrease/maintain/improve (variable B)? Why or why not?

These questions were designed to address issues of the relationship between research design and the types of conclusions that can be drawn based on that design, as well as critical thinking as application of research.

Feedback

Both written and oral feedback on the individual assignments were provided during the next class period. Written feedback included general questions about correlation (e.g., what makes the design a correlational one? why does correlation not equal causation?), specific suggestions to focus on for that particular research study (e.g., what kind of variables could explain the difference between the chocolate eaters and the non-chocolate eaters?), and question-by-question responses based on each individual student's response. Oral feedback was provided by going over each question and the answers as a class. Students were encouraged to ask questions. After each small group activity, additional class discussion occurred in which each group's study was explained and that group answered questions from the other students.

Results

The percentage of students who correctly answered and explained their answer to each question was computed (See Table 1). In order for a response to be counted as correct, the student had to also provide a correct explanation. For example, a student who correctly identified the research design as correlational but did not explain why it was a correlational study was not counted as having a correct answer.

Table 1 Percentage of students who correctly answered each question:

Research Summary	1	2	3	4	5
Design	38*	64	77	100	50**
Causal relationship?	6	14	23	39	56
Researchers' explanation	69	86	85	92	100
Alternative explanation	75	79	100	77	81
Potential problem	44	71	69	69	81
Recommendation be made?	38	50	31	31	56
Number of students	16	14	13	13	16

**an additional 18% gave correct answer, but no explanation*

***the other 50% identified the specific methodology (e.g., survey) rather than the design*

The percentages of correct responses and the types of responses that students gave for each question were examined. The types of correct and incorrect responses were similar for each summary. For Summary 1, less than half of the students correctly identified and explained that this was a correlational design. Those who correctly answered that the study was a correlational design explained that none of the variable were manipulated, nor were the participants randomly assigned to groups. Those who answered incorrectly responded in three ways: they correctly identified the study as correlational but did not explain their response (18%); when they offered an explanation, they used such statements as, "the researchers showed that the variables were related in some way", or "the researchers discovered two areas of research that were correlated and examined them" without explicitly explaining what the researchers did that made this a correlational design (13%); or they misidentified the study as an experiment and explained that the amount of chocolate consumption was manipulated by the researchers (24%). One student just did not answer the question. On Summaries 2-4, students improved their ability to correctly identify and explain why each study was a correlational design. However, on Summary 5, 50% of the students identified the specific methodology used (e.g., survey) rather than the more general research design (correlation versus experiment).

For Summary 1, very few students correctly explained the relationship between the type of research design and the type of conclusion that can be drawn. The few students who did so noted that other variables were not controlled and no variables were manipulated, so a causal relationship between the variables could not be determined. A few of the students who answered incorrectly did not explain their answer (19%), but the majority (75%) discussed characteristics of that particular study that have no relevance

to whether a causal relationship could be established. For example, students focused on the number of participants or characteristics of the participants (e.g., age and gender). These aspects are relevant to issues of generalizability of the findings, but not the type of conclusion that can be made. The ability to relate the research design to the type of relationship between the variables improved with repeated practice, although on Summary 5, there were still several students (25%) who responded, "no because the researchers did not examine the reasons why people engaged (in this behavior)." Although there was improvement over the semester, less than 60% of the students correctly explained their answer on Summary 5.

The percentage of students who were able to identify the researchers' explanation for the findings and to suggest alternative explanations was quite high on Summary 1 and remained so throughout the semester. It was expected that identification of the researchers' explanation would be high as that was explicitly identified in summary. While most students were generally able to offer correct alternative explanations for the findings, a few students struggled by offering a potential explanation but not clearly linking it to both variables. For example, on Summary 1, 19% of the students said the results could be explained by lifestyle issues without directly connecting a "lifestyle issue" to both amount of chocolate consumption and blood pressure level. Examples of correct alternative explanation were "consuming chocolate releases endorphins, which decreases stress, which lowers blood pressure", and "men who consume larger quantities of chocolate adjust for the increase in calories by exercising more than those who don't consume more chocolate, and this increase in exercise reduces blood pressure."

The percentage of students who were able to identify potential problems in the study increased after Summary 1 and remained quite high throughout the semester. For Summary 1, many students (38%) discussed generic issues (e.g., sample size) without addressing variables specific to the study (e.g., having only male participants). The majority of students by Summary 2 were able to be more specific in their description of potential methodological problems, and the percentage increased or remained the same for the other summaries.

One question which students consistently struggled was whether researchers could make recommendations for people to engage in (variable A) in order to decrease/maintain/improve (variable B). At least half of the students consistently struggled with question, often talking around the question without directly answering it or expressing their beliefs (e.g., "I believe that this relationship could be possible, so yes, researchers can make this recommendation"). For those students who gave a direct incorrect answer, they gave responses such as, "this is only one study and if it were done again, it could yield different results" or "there is no direct link between the variables" without recognizing that the researchers were not examining whether engaging in a certain behavior led to a change in the other behavior. Students who answered correctly explained issues about generalizability (e.g., findings are based only on one study, issues with the sample) or that the researchers did not determine whether engaging in A led to B.

In general, there was improvement in students' ability to answer most of the evaluation questions correctly and to explain their answers with repeated practice. After

the small group discussions (after Summaries 2 and 4), there were generally either no changes or increases in the percentage of students who correctly answered each question. The exception was on Summary 3 for the question on whether the researchers could make recommendations. The study used in Summary 3 had a large sample size (N=9000) and many students (38%) used the sample size as their explanation for why the researchers could make recommendations (e.g., "yes because they tested a lot of people").

While there was general improvement in students' ability to evaluate the summaries, there were two areas where I think students need further assistance. First, the question, "Can the researchers conclude that (variable A) causes (variable B)?" In response to this question, students did not demonstrate a full understanding that the type of design used determines the type of conclusions that can be made between variables. Rather, a large percentage of students, even after repeated feedback, still gave responses like, "there is not enough research presence to conclude that", "no, the research explains that a person is just at a greater risk", and "correlation does not mean causation" without an explanation as to why causal relationships cannot be made from correlational data. Second, the question, "Can researchers make recommendations to engage in (variable A) in order to decrease/maintain/improve (variable B)?" is an area where students need more explicit instruction. While over 50% of the students correctly answer the question on Summary 5, only a few individuals went beyond the relationship between the study's variables to discuss other considerations of the research content. For example, in the chocolate and blood pressure study (Buijsse, et al., 2006) described earlier, only one of the 16 students mentioned that chocolate usually also contains fat, sugar, and oils which, if eaten in large quantities, could lead to health problems. The ability for students to think beyond the findings of a specific study to the effects that a study may have on the behavior of individuals on a daily basis is important because it places research in a context where there could be potentially negative implications. Students need to see research as useful and need the skills to not only evaluate a particular study, but the significance of the findings.

In general, the majority of students (50% or more correctly answered every question on Summary 5) were generally doing well in evaluating the research by the end of the semester. However, there were three students who consistently struggled on the assignments. Two of these students only did Summary 1 and Summary 5, so they did not have repeated practice with feedback. In addition, these three students struggled with the content of the entire course, not just the summary evaluation component.

What I learned and revisions made for Time 2 – Spring 2009

After examining student performance in Study 1, I think that the repeated practice evaluating research summaries in the popular media is an important way to help students think about research. The majority of students showed improvement in both correctly answering the questions and in articulating explanations to their answers.

However, I am not sure that having students work in small groups to design a study around an alternative explanation helped them to answer the research evaluation questions. I think those small group activities help students to think more about designing specific research studies (e.g., thinking about operational definitions, how to

collect data) rather than evaluating research in the context of the questions they were asked to answer in this series of assignments. So for the next semester, I altered the assignments slightly. Students still did the same five research evaluations on the same time schedule, but only completed the small group activity where they had to design a study to examine an alternative explanation for Summary 2. Then after research Summaries 3 and 4, students worked in small groups to go over their homework answers after I returned their graded assignments to them. After about 15 minutes of small group discussion, we went over the answers as a class.

Sixteen undergraduate students, mainly juniors and seniors enrolled in Research Methods, participated. Once again, the percentage of students who correctly answered and explained each question was computed (see Table 2). The types of responses given were also examined.

Table 2: Percentage of students who correctly answered each question:

Research Summary	1	2	3	4	5
Design	56*	75	60	80	75
Causal relationship?	25	56	67	73	81
Researchers' explanation	82	94	100	100	94
Alternative explanation	63	75	93	47	56
Potential problem	63	88	80	80	88
Recommendation be made?	44	69	53	60	69
Number of students	16	16	15	15	16

**an additional 26% gave correct answer, but no explanation*

As a group, students generally did better on the assignments in this class than students did in the previous semester. More of them were able to articulate correct explanations for their answers. Similar to the previous semester, on Summary 1, many students who correctly identified the type of design used could not or did not give an explanation for their choice of design. Most of the students who explained their responses replied that the researchers found a relationship between the variables without explicitly discussing what made these studies correlational designs. The types of correct and incorrect responses for each question were quite similar to those given in Study 1 for each summary. By Summary 2, performance was generally quite high, except for the type of conclusion that can be drawn. Student performance fluctuated after the small group assignments after Summaries 2, 3, and 4, but was quite high on

most questions. While students in Study 2 were doing better at discussing whether the researchers could make recommendations than students in Study 1, I would like to see an increase in the percent of students who can correctly discuss this issue.

The one area where this group of students also needs further assistance is on describing an alternative explanation for the findings. Students showed improved performance over the first three assignments, but on the last two evaluations, a large percentage of students were providing an alternative explanation but not linking it to both variables in the study or were providing an explanation that was part of the researchers' explanation. For example, one study (Robinson & Martin, 2008) found that unhappy people watch more TV while those who consider themselves happy spend more time reading and socializing. An alternative explanation offered for the findings was that "unhappy people have more life stressors compared to happy people" without linking the explanation to TV viewing habits. Being able to produce an alternative explanation for a researcher's findings is important because it helps students to see that these relationships are correlational, not causal because rival hypotheses have not been ruled out. But in order to be a plausible explanation, it has to account for both variables. The ability to generate potential explanations underscores the importance of the type of design used, and hence the type of conclusions that can be drawn from the results.

Conclusions

My first research question asked whether students could accurately evaluate research summaries in the popular media. Looking only at students' performance on Summary 1 in both Study 1 and 2, students did relatively well on the questions about identifying the researchers' explanation and proposing an alternative explanation for the findings, with over 60% of the students answering both questions correctly; however, students tended to struggle with the other four questions, especially whether a causal relationship between the variables can be concluded from the research and whether the researchers can make recommendations to engage in one variable in order to affect the other. My second research question examined whether repeated practice and small group discussion improved students' ability to evaluate popular media research summaries. Overall, the percentage of students who correctly answered each question generally showed an increase with repeated individual practice and after small group discussions during Study 1, but with some fluctuations in performance in Study 2. By assignment 5, at least 50% of the students in both Study 1 and Study 2 correctly answered every question. In addition, students were also better able to explain their responses in writing. While students in Study 2, as a group, generally performed better than those in Study 1, fluctuations within each semester could be due to not all students completing every assignment and some students consistently struggling with this component of the course. One needs to be cautious in comparing data from Study 1 to Study 2. The two sections were composed of different students and there could be characteristics that differentiate those two groups from one another, rather than changes in the small group activities. However, the pattern of results was similar between the two groups of students, suggesting that repeated practice increased students' ability to evaluate summaries of popular media research studies. The increase

in performance after small group activities also suggests a benefit of these activities for most students.

Looking at the students' performance, I think that this is a worthwhile activity to help students think about research beyond the typical activities of designing a study and evaluating empirical studies published in scholarly journals. Because secondary sources of information are becoming more widespread, especially via the Internet, it is crucial that students learn to critically read and judge this information, in particular because there are no universal standards for posting information on line (Metzger, 2007).

The next step in using these assignments in class is to do more with helping students to go beyond the specifics of each research scenario by helping them identify some of the real life consequences of making causal inferences. For example, using the results of a study that examined the relationship between pet ownership and changes in physical and psychological health (Raina, et al., 1999), I would have the students explain in both a written assignment and class discussion what some of the implications would be of older individuals interpreting this correlation as a causal relationship, such as not being able to afford the daily care and health care costs of pets, not considering lifestyle issues that may preclude pet ownership (e.g., living arrangements, allergies, etc.), and life expectancy issues of the pet versus the individual. I hope that by having students consider these broader consequences, they may be more reluctant to say, "yes, the researchers can make recommendation to do A in order for B to happen because the results were statistically significant" and think more about what the research conclusions might actually mean in the real world. Having students address specific additional questions, such as, "what impact could engaging in A have for people in their everyday life, and for you specifically?" might make the implications clearer and more relevant.

Teaching students to evaluating research reports in the popular media may present some unique challenges. Research examining students' assessment of the credibility of online information has found that individuals may have difficulty with this task (Metzger, Flanagin, & Zwarun, 2003; Wiley, et al., 2009). If students evaluate Internet sources, they are doing so casually, without seeking additional verification of the information (Graham & Metaxas, 2003; Grimes & Boening, 2001; Wiley, et al., 2009). Therefore, students may need explicit instruction in evaluating research presented in the popular media because details of the research procedure are lacking. For example, two of the summaries used in my research methods class were studies that used data from larger data bases (e.g., Zutphen Elderly Study, National Health and Nutrition Examination) and students were often under the impression that the current researchers were merely reporting on findings from the original researchers, not that the current researchers were actually analyzing information from the data set. In two other summaries, specific scales were used but not described. Students could be explicitly taught how to find information on these kinds of data bases or how to review different kinds of measures that are reported but not described. Another technique that could be used would be to have students compare the popular media summary to the original study to see if their answers to the evaluation questions changed. This activity may help students to understand that vital information is missing from popular media reports and that the

writer of the article is not a researcher but rather a journalist who may not understand the research he/she is summarizing and may misinterpret the findings and conclusions.

In summary, the two studies presented in this article examine undergraduate students' abilities to evaluate summaries of popular media reports. Performance generally increased with both practice and small group activities. However, there are still areas where some students struggled, such as being able to connect the type of research design with the conclusions that can be made. Understanding research summaries presented in the popular media may present some unique challenges for students.

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