INTRO PSYCH SCIENTIFIC REASONING MODULE: TEEN DRIVING

INSTRUCTOR GUIDE FOR SMALL CLASSES

TOPIC: HUMAN DEVELOPMENT

Photo source: https://blog.research.chop.edu/evaluating-how-peer-passengers-affect-teen-drivers

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Summary

In this module, students learn how researchers can use experimental designs to answer questions with real-world policy implications. Students get hands-on practice reading and interpreting a graph with multiple independent variables, and a complex bar chart showing an interaction between two independent variables.

Topic Human Development

Source Article

Gardner, M., & Steinberg, L. (2005). Peer influence on risk taking, risk preferences, and risky decision making in adolescence and adulthood: An experimental study. *DevelopmentalPsychology, 41,* 625-635.

Content Specific Student Learning Objectives

1. Think critically about explanations for higher accident rates among teen drivers than among more experienced drivers.
2. Evaluate the relative benefits or drawbacks of simulation research designs.
3. Read results presented in graphical form and understand how to interpret an interaction.
4. Draw conclusions about research findings as they relate to real-life problems.

APA Learning Objectives (2.0)

1.1 Describe key concepts, principles, and overarching themes in psychology.

1.3 Describe applications of psychology.

2.1 Use scientific reasoning to interpret psychological phenomena.

2.2 Demonstrate psychology information literacy.

2.4 Interpret, design, and conduct basic psychological research.

MCAT Learning Objectives (2015)

Psychological, Social, & Biological Foundations of Behavior: Foundational Concept 7A

Scientific Inquiry & Reasoning Skills

Skill 2: Scientific Reasoning and Problem-solving

Skill 3: Reasoning about the Design and Execution of Research

Skill 4: Scientific Statistical Reasoning

Class Time 30 - 45 minutes

Other Resources For This Module

Student Handout, PowerPoint slides

BEFORE CLASS

Copy Student Handouts – 1 per student.

Read through this guide, getting an estimate for how much time to spend on each piece, depending on the time you have available.

Be sure you understand the "chicken game" well enough to explain it in front of students.

DURING CLASS

SET THE STAGE

[Slide 1] (title slide)

- Getting a drivers' license is often a rite of passage during adolescence and thus an important developmental issue
- Ask students if they believe adolescent drivers are risker than other drivers. Discuss possible reasons why
- Students may come up with explanations including teens having less experience driving (driving is less of an automatic process) and incomplete prefrontal cortex development
- Make the point that even though it seems plausible or likely, we still need empirical data. It's possible that we just imagine a correlation between age and accidents that is based on stereotypes

ACTIVITY

[Slide 2] (correlational data slide)

- These are real data showing rates of fatal car accidents per 100,000 miles driven for different demographic groups
- Ask students to consider the following data in pairs:
    - Do they support a difference in rates of fatal accidents for teen drivers compared to adult drivers?
    - What other patterns do you notice in these data?

- As a full class, discuss data, highlighting key points:
    - One DV: fatal accidents (controlling for miles driven)
    - Three IVs (predictor variables): Year, sex/gender, and age
    - Ensure class notices the following three patterns:
        - Teens are involved in more crashes than are older people
        - Boys and men are involved in more crashes than are girls and women
        - Big decrease in fatal crashes from 1989 to 1992… but only for adolescents (students might have predictions for this – possible changes in seatbelt law)
    - Note that these are correlational data
        - Results indicate a relationship between age of driver and likelihood of fatal crashes but we can't assume causality. Discuss how experimental designs might help us understand some <u>reasons</u> for different rates of fatal accidents between teens and older adults
        - We can't randomly assign people to be 'older' vs 'younger'
        - But we can look at a study that experimentally manipulates something that might influence teens and older adults differently

[Slide 3] (chicken video game screenshot)

- One hypothesis for differences between teens and older adults has to do with effect of <u>peers being present in the car</u> – might a peer make you drive more dangerously?
- You'll be examining a study that uses a simulated driving game… we'll call it the 'chicken' driving game… going to describe the task briefly before passing out a description of the larger study for you to analyze
    - Video game simulation
    - As you're driving you accumulate points
        - At some point the light will turn yellow indicating that at some point soon the brick wall will come down

        - If you hit the brick wall, you lose all of your points
        - Risky driving assessed by how long the driver keeps going after the light turns yellow

Pass out student handout.

- Break into small groups—have students read the handout then form small groups to discuss the questions
- While students are in groups, circulate and talk with groups to address possible misconceptions
    - Q1 – most students will get that 'risky driving' is the outcome (you might discuss how that was operationalized); be sure students notice <u>both</u> predictor variables (1) age – adolescent/young adults/adults and (2) driving condition – alone/group
    - Q2 – only driving condition (alone/group) is experimentally manipulated. In some groups, might discuss how you can't manipulate participants' ages… however by experimentally manipulating whether doing the task alone or in a group, we will be able to see the possible causal effect of having peers present (and whether that effect differs for teens versus other age drivers)
    - Q3 – be sure students notice the interaction
        - Focus especially on the interaction – note that using the criterion described, adolescents and young adults appear to drive in a more risky way when peers are present, but this effect is NOT true for older adults
        - See full class discussion below for additional points
    - Q4 – students might come up with several limits, including use of a simulation, how age groups were operationalized (note that some 'adolescents' are not yet driving age); etc. For any limitation, encourage students to consider why things might have been done that way and whether / how a future study could be modified to address that limitation
    - Q5 – answers will vary; this item is also good for full-class discussion (see below)

Once most groups have answered questions, bring the class back together for full-class discussion.

[Slide 4] (study data – full class discussion)

- As full class, discuss questions from handout (rather than stepping through each question, can choose specific items or go through first items quickly then move beyond handout questions as indicated below – however, it is often useful to begin with identifying the DV(s) and IV(s) and whether the IV(s) are experimentally manipulated
- For the data slide, make sure students see all three effects:
    - Adolescents are generally riskier drivers (main effect of age – but see qualification below)
    - Driving with peers is generally riskier than driving alone (main effect of driving condition – but see qualification below)
    - HOWEVER – notice how it's really about age and driving condition INTERACT
        - Driving with peers leads to riskier driving for adolescents, and also for young adults… but there is NO significant difference for older adults
        - Likewise, adolescents are generally riskier drivers than the other age groups, but notice given our criterion for statistical significance, this is actually NOT true if comparing adolescents driving alone and young adults driving alone
    - Depending on time and interest, discuss limitations identified and possible conclusions / implications – some possibilities are listed below
    - It would be useful to know if actual accident rates vary according to whether or not peers are in the car
        - Many states have assumed that they are different and have instituted graduated licenses in which those who have recently obtained a license may not drive with peers in the car (students can discuss their personal experience with these laws, which often differ by state)
    - Can peers influence driving behavior even if they're not in the car?
        - Discuss implicit peer pressure (adolescents may behave in ways consistent with their expectations for what other peers would expect them to do, even if peers aren't present)
        - Brainstorm other study designs that could help address this

- People may behave differently when trying to win points in a videogame than when actually driving
- Are there other things, like cell phones and texting, that are a bigger problem than actual passengers? (note: a separate module is available that examines research on the effect of cell phones on driving)
- Do these results have implications for behaviors other than driving?
    - Even though the videogame involves driving, the results may reflect "risky behaviors" in general

CONCLUDING THOUGHTS

Full class discussion about the following points:

- This study shows how the experimental method can be used to understand one factor that can influence risky driving, and that might have public health impacts
- Also provides an example of how research can inform law making
- Conclude by pointing out how one study never tells the whole story. Each new study contributes evidence in support of a theory. Multiple studies with different features that converge on the same set of findings help us best understand the question