INTRO PSYCH SCIENTIFIC REASONING MODULE: SCHOOL START TIME

INSTRUCTOR GUIDE FOR SMALL CLASSES

TOPIC: BIOLOGICAL

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Summary

In this module, students discuss a quasi-experimental study, conducted at a boarding school, in which differences in sleep and sleep behaviors were measured before and after changing the school start time. Students learn how researchers can take advantage of natural experiments to test hypotheses that are difficult to study using true experiments. Students gain practice thinking about the differences between correlational, quasi-, and true experiments in terms of the conclusions that can be drawn. Students also think about using psychological science to inform educational policy.

Topic Biological

Source Article

Boergers, J., Gable, C., & Owens, J. (2014). Later school start time is associated with improved sleep and daytime functioning in adolescents. *Journal of Developmental & Behavioral Pediatrics, 35,* 11-17.

Content Specific Student Learning Objectives

1. Evaluate arguments about causes and consequences by identifying features (i.e. quasi-experimental design, random assignment) of the research design that suggest associations between variables.
2. Think critically about generalizing to populations beyond which was represented in a sample. made from a single private boarding school.
3. Identify conclusions that are supported by research results, and discuss potential confounds given the research design.
4. Determine the implications of results for real-world situations.

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 6B
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 how the boarding school study was set up so you can point to potential uncontrolled variables and also identify controlled variables.

DURING CLASS

SET THE STAGE

[Slide 1] (title slide)

- Ask students if they have ever experienced daytime sleepiness
    - Was there an age when they noticed a change in when they felt ready for bed, or in daytime sleepiness?
- What factors may influence quality and length of teen sleep?
    - *Write student ideas on board – e.g. work schedules, more school work, social activities…*
    - *Add circadian rhythms & school start times if students don't mention them*

ACTIVITY

[Slide 2] (why change school start times?)

- Explain how research generally supports anecdotal evidence that adolescents have trouble falling asleep at night, even when sleepy during the day
    - This can be linked to a "delayed phase preference" or a shift to preferring to go to sleep later in the evening and sleep later into the morning
- However, most middle and high schools have start time that conflict with this preference
    - If high schools start early, teenagers have to get up early to get there
    - A lot of school districts are starting to take notice of this issue

- *Psychology research can provide evidence to inform educational policy.*
- What factors must school districts take into account when deciding to change school schedules?
    - Write student ideas on board, making sure to include the following if not generated by students:
        - Time for after school sports before dark. Coaches are some of the biggest opponents of later school start times
        - Family schedules – Parents may need to be at work before school starts – what about transportation?
        - Bussing – Most districts use one set of busses for elementary, middle and high schools, so changing high school times affects all

[Slide 3] (experimental evidence)

- Not an easy decision, would want EVIDENCE to support the decision to make a change…
- You'll be examining a study that compared sleep time and sleepiness behaviors in a residential boarding school that modified its schedule between Fall and Winter terms

Pass out student handout.

- Break into small groups – have students read the handout then form small groups to discuss the questions
- While students work, circulate among groups to check for student errors in understanding and guide students to consider alternative possibilities
    - On Q1, ensure students note ALL the dependent variables (sleep duration and daytime sleepiness behaviors)
    - On Q2, students may be willing to accept the authors' claim that the changes they observed were based purely on a later school start time
        - Emphasize the actual manipulation (entire school day was shortened, not just moved back 25 min) and have students think about the conclusions that can be made given this manipulation
    - On Q3, encourage students to think about ways teens at a boarding school may differ from students of the same age at other schools, and differences between high schools in general
- Then, bring group back together to highlight key answers/points

[Slide 4] (evaluate this study)

- What is the independent variable?
    - Modified school schedule
        - Note for students that studies can often have >1 IV, here just one
        - Note that it is important to look carefully to see how it's manipulated… This is tricky in this study, because it's not just "school start time" that is modified. It's the whole school schedule. (later start, but also shorter class days overall - might be an opportunity to discuss CONFOUNDS with the manipulation)
- What is/are the dependent variable(s)?
    - Sleep duration AND several daytime sleepiness behaviors
        - Reinforce again that studies can often have multiple DVs. Need to consider them all
        - Can ask class if they would CHANGE any of the DV(s)…E.g., is it odd to measure "sleep" as just % getting more or less than 8 hours?
        - Can ask class if there are ADDITIONAL DV(s) they would have liked to see…e.g., asking about bedtimes, or other self-report measures, or looking at student grades. Note that sometimes a new study will simply include new or different DVs
- Is this a between or within subjects design?
    - This study is within subjects, all subjects were included in the experimental and control group
- Is this a "true experiment" or "correlational design?"
    - Neither, really…
    - Introduce the term quasi-experimental design
        - No random assignment
        - But they did manipulate the school schedule

[Slide 5] (Figure 1)

- Have student volunteers describe the patterns of results they see in the figure
- Ask class whether the difference is causal?

- Given it's not a TRUE EXPERIMENT, what other factors might explain the difference?
    - Example issues: changing seasons for T1 to T2, different levels of school work at survey times, shorter school days
    - Introduce the term "confound"

[Slide 6] (Table 1)

- Have student volunteers describe the patterns of results they see in the table
- Ask class whether the difference is causal?
    - Reinforce quasi-experimental design and the term "confound"
- Remind class of the ideas for additional DVs that has been brought up earlier

[Slide 7] (Implications)

- How could you modify this study to draw stronger causal claims?
    - Students may generate ideas related to between-subjects designs; random assignment of different schools to different schedules
- Can the findings be generalized?
    - Discuss ways students may differ between types of high schools (public, private, boarding) and between high schools in general
        - Students who live at home and commute to school may have different sleep patterns than those at a boarding school; students may vary in racial or socioeconomic diversity across types of schools
- How would (or would) you use these, or other findings, to argue for changes in school start time?
    - Is there good evidence from this study for a school district to change their school start time?
    - What evidence would be "enough" to encourage a change?

CONCLUDING THOUGHTS

- Remind students again of the importance of using research and psychological science to inform policy
    - In this case, a policy that could have impacted each and every one of them

- Many other studies have been done, finding benefits across a variety of DVs (including sleep time, depressive symptoms, absenteeism, grades) and few drawbacks
    - Many of these studies have also been quasi-experimental, in which entire districts push back the start time, often half an hour to an hour and compare student behaviors before and after the change