

Supplemental Material

CBE—Life Sciences Education

Walck-Shannon *et al.*

Supplemental Materials for Walck-Shannon *et al.* (2023) “A Study Planning Exercise Associated with Decreased Distraction Levels Among Introductory Biology Students.”

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Supplemental Material 1: Intervention Materials

Exam 2 Planning Exercise

Link Description: In this exercise, you will make a plan for the time between now and Exam 2. The exercise takes about 15-20 minutes. If the exercise is fully completed by Friday, March 19th at 11:59PM, you will earn full credit for Weekly Online Quiz VIII.

Please answer these questions honestly; your instructors will not view any or analyze responses until after final grades have been submitted.

To ensure that you receive credit for completing this exercise, please fill out the following information. A copy of your responses will be emailed to the address that you provide below.

First Name _____
Last Name _____
Student ID _____
Email Address _____

In this exercise, you'll be asked to reflect on your study habits and identify particular habits to change and maintain. Then, we'll guide you through a brief psychological technique to help you follow through on your planned changes in preparation for Exam 2.

Here is some advice from learning researchers, as it applies to this course:

DO	DON'T
<ul style="list-style-type: none">• Take notes in your own words• Space out your studying over time• Test yourself using Problem Sets, ungraded quizzes, or Old Exams• Explain concepts to yourself and others• Summarize/outline your notes using the Study Guides to help you prioritize	<ul style="list-style-type: none">• Get distracted by technology• Highlight too much of your notes• Just re-read the slides or your notes• Read over the Problem Set or Exam keys without trying to answer the questions first• Rewrite your notes word-for-word

1. Think about how you studied for Exam 1. Which study habits were useful and will be most important for you to *maintain* for Exam 2? Write down 1-2 habits and explain why they are important to maintain.

2. Think about the above list of suggested study habits. Which study habits will be most important for you to *change* for Exam 2? Write down 1-2 habits and explain why they are important to change.

3. What is the most positive outcome of maintaining and changing the study habits above in the next two weeks? Visualize that outcome and write down all of the thoughts and images associated with it in as vivid detail as possible.

Here is just one possible example: I will go into the room on exam night feeling calmer and at ease. As I sit down in my chair, I will feel confident that I am prepared...

4. Research shows that making a **specific** and **realistic** plan helps people achieve their goals. Focus on one habit to change/maintain from the previous questions that you think will be either particularly difficult or important, and write it here:

5. Next, select one or two approaches from the list below that you would like to incorporate into your plan to maintain or change this habit. On the next page, you will get more specific guidance based on your selection(s).

- **Set aside a time and place.** Put specific 1-2 hour blocks of time on your calendar to study for this class and decide where you will study. Treat this time like a class or meeting; it is reserved time that cannot be rescheduled.
- **Prioritize key information.** If you have a lot going on, you'll need to prioritize. This will include skimming through your notes to pick out the most important topics and setting times to study each one.
- **Start with a small thing.** If it's hard for you to get started studying, start with a task that is easier or takes a short amount of time. Once you get started, it's easier to keep going.
- **Work with someone else.** Social interaction might help motivate you to study and making a plan in advance to work in a group can help hold you accountable.
- **Alter your environment or find a new location.** If you get distracted while studying, you might need to put your cell phone out of sight, turn off notifications, or use an app for your computer that blocks certain websites. You might also want to find a new place to study.
- **Make a plan to get help.** If you feel that your study habits haven't been working or there is material that you are having trouble understanding, make an appointment with your instructor and/or one of the Assistants in Instruction (AI).

6. Planning prompt (will vary depending on selected approaches, students will only see 1-2):

- If selected **set aside a time and a place**: To get started now, pull up your calendar and either: (1) block off a single day and time to make your plan or (2) identify a recurring time slot that you could use to study. Be sure to pick realistic times. For example, don't plan to study immediately after a long day of classes because you'll probably be too tired. Then, briefly describe what you will do during that time to change/maintain your study habits.
 - i. Fields to fill in: Day and time to make plan or study; What you will do during that time
 - If selected **prioritize key information**: We suggest that after making a list of the most important topics, you estimate how much time you'll need to study each one, and then look at your calendar and choose specific days you will work on each topic.
 - i. To get started now first write down some ideas for how you'll identify the important topics when you go through your notes. (One place to start might be our Study Guides on Canvas.)
 - ii. Then, decide when you will make your daily study plan.
 - If selected **start with a small thing**: To get started now, write down a few easier tasks you could use to get you started on your studying. For example, make a few flashcards of important definitions, summarize a small section of your notes, or take one ungraded practice quiz.
 - If selected **work with someone else**: To get started now, write down 1-2 people with whom you study effectively and make a plan for when you'll ask them to study with you. You'll need to monitor whether you are really studying or just getting distracted in a group. Sometimes the best person to study with is not a close friend, but another class mate.
 - If selected **alter your environment or find a new location**: To get started now, write down what your distractions are and write a plan for exactly what you'll do to combat these distractions. If you need a new location, write down where you'll go or whom you'll ask to help you find a good place.
 - If selected **make a plan to get help**: To get started now, decide who you will ask for help and when you will contact them. You can check the syllabus for email addresses, help sessions, and office hours. Then, write down some questions that you need to ask when you meet.
7. From research, we also know that thinking about solutions to an obstacle in advance can help you overcome that obstacle. First, think of one major obstacle that could prevent you from sticking with the plan you just made. Then commit to overcoming this obstacle by writing an If-Then statement like one of the following:

“If I’m tempted to cancel my designated study time [*obstacle*], **then** I will remind myself that I need to start studying early and I’ll go to the library to study [*solution*].”

“If I don’t feel like working on Saturday afternoon [*obstacle*], **then** I will start by making flashcards about various proteins’ roles in DNA replication [*solution*].”

“If I start to get behind on my plan [*obstacle*], **then** I will choose which things to prioritize and revise my plan [*solution*].”

“If I am tempted to check my Instagram while studying [*obstacle*], **then** I will remind myself that it can wait and silence my phone and put it in my backpack [*solution*].”

“If I realize that I don’t know what to study [*obstacle*], **then** when I get out of my morning classes tomorrow I will check the list of office hours and plan which one to attend [*solution*].”

Your commitment statement:

If [*obstacle*] _____,
then I will [*solution*] _____.

8. To finish this planning exercise:

A) Vividly imagine a scenario where you are likely to encounter the obstacle that you just stated.

Now, write down details about this scenario, such as where you are, what is going on, how you are feeling, etc.

B) Last, continue to imagine yourself in that scenario, but also imagine yourself doing the actions to follow through on your plan.

Write down the details that you just imagined about following through on your plan.

Thank you for completing this Exam 2 Planning Exercise! We hope that you found it helpful. Shortly, you will receive an email from Qualtrics confirming your completion that contains your responses for reference.

Reflection: Exam 1

Post-exam survey: Exam 1

The following questions help you reflect on your study and health habits leading up to Exam 1. This will take about 5-10 minutes to complete. **If you complete all of the questions, you will receive full-credit for this week's pre-lab quiz.**

Please answer honestly, your instructors will not see the responses given by individual students. And, your instructors will not see any aggregate responses until final grades are submitted.

1. For the following questions, please only input numbers into the fields. Don't include words like "hours" or "days." Also, please answer each question honestly; your instructor will not see your individual responses. But, the responses will help us give better advice to future students.
 - What is the number of Bio 2960 class days that you missed between the start of the semester and Exam 1? There were a total of 15 class days.
 - On average, about what percent of the time were you distracted during class? (0-100%)
 - On average, about what percent of the time were you distracted while studying? (0-100%)
 - In a typical **non-exam** week, how many hours did you spend studying for Bio 2960? Please do include hours in BTL sessions, Study Halls, etc., but do not include in-class hours.
2. Please fill in the approximate number of hours you spent studying for Exam 1 on each of the following days. Use 15 minute increments (.25, .5, .75 hrs.). Use a 0 if you did not study on a particular day. Please include BTL sessions, Study Halls, Review Sessions, etc. in your estimates.

[Have 7 days with blanks next to them that students fill in.]

[Mon, 2/11: _____ hours

...]

If you started studying for the exam before Monday, February 11th, please estimate the total number of hours that you spent studying **BEFORE** that day. Please leave blank if this does not apply to you.

3. Which of the following did you do to prepare for Exam 1? (check all that apply)
 - a. Read textbook
 - b. Watched lecture videos
 - c. Read lecture slides or class notes

- d. Re-wrote your class notes word for word
 - e. Paraphrased or outlined class notes (includes creating a study guide or writing out answers to the provided study guides)
 - f. Made my own diagrams or comparison tables from lecture notes
 - g. Reviewed online content from sources outside of the course (e.g., videos)
 - h. Answered the Problem Set questions
 - i. Answered the old Exam questions
 - j. Quizzed myself using ungraded weekly quizzes, quizlets, flashcards
 - k. Explained concepts to myself or others (includes any explanations that you give in BTL groups)
 - l. Attended the Exam Review Session, Study Hall, Office Hours, etc.
 - m. Other
4. If you selected "Other" on the previous question, please explain: _____.
5. For the strategies that you selected on the previous question, fill in the percent of your total Exam 1 study time that you spent on each one. Altogether it should add up to 100% of the time that you studied for Exam 1.
- a. Read textbook
 - b. Watched lecture videos
 - c. Read lecture slides or class notes
 - d. Re-wrote your class notes word for word
 - e. Paraphrased or outlined class notes (includes creating a study guide or writing out answers to the provided study guides)
 - f. Made my own diagrams or comparison tables from lecture notes
 - g. Reviewed online content from sources outside of the course (e.g., videos)
 - h. Answered the Problem Set questions
 - i. Answered the old Exam questions
 - j. Quizzed myself using ungraded weekly quizzes, quizlets, flashcards
 - k. Explained concepts to myself or others (includes any explanations that you give in BTL groups)

- l. Attended the Exam Review Session, Study Hall, Office Hours, etc.
 - m. Other
-
6. About what percent of your Exam 1 study time was spent studying with other students? (This can include BTL sessions, or informal groups where you quizzed each other, explained concepts to each other, etc.) [0-100]%
 7. Did you ask your instructor or one of the AIs for help (can include office hours or study hall)? [yes/no]
 8. Since the beginning of the semester, in a typical week about how many hours of sleep did you get each night?
 9. Please fill in the number of hours you slept on each of the following nights. Use 15 minute increments (.25, .5, .75). Use a 0 if you did not sleep on a particular night. [Have 2 days with blanks next to them that students fill in.]
 10. Since the beginning of the semester, in a typical week about how many days did you exercise?
 11. Please fill in the number of hours you exercised on each of the following days. Use 15 minute increments (.25, .5, .75). Use a 0 if you did not exercise on a particular day. [Have 7 days with blanks next to them that students fill in.]
 12. Since the beginning of the semester, in a typical week how would you rate your eating habits? [Very unhealthy, moderately unhealthy, slightly unhealthy, slightly healthy, moderately healthy, very healthy]
 13. In the week before Exam 1, how would you rate your eating habits? [Very unhealthy, moderately unhealthy, slightly unhealthy, slightly healthy, moderately healthy, very healthy]

Reflection: Exam 2

Post-exam survey: Exam 2

The following questions are about your habits leading up to Exam 2. This will take 5-10 minutes to complete. The purpose is to help you reflect on your study and healthy habits.

Please answer honestly, your instructor will not see the responses given by individual students.

1. Please report the following by inputting numbers into the fields. Don't include words like "hours" or "days."
 - What is the number of class days that you missed between the Exam 1 and Exam 2? There were a total of 15 class days.
 - About what percent of the time were you distracted during class? (0-100%)
 - About what percent of the time were you distracted while studying? (0-100%)
 - In a typical **non-exam** week, how much time did you spend on this class (total number of hours per week)? Do NOT include in-class hours.

2. Please fill in the approximate number of hours you spent studying for Exam 2 on each of the following days. Use 15 minute increments (.25, .5, .75). Use a 0 if you did not study on a particular day. If you started studying earlier than Monday, March 18th, there will be another question about that next.

[Have 7 days with blanks next to them that students fill in.]

[Mon, 3/18: _____ hours

...]

3. If you started studying for the exam before Monday, March 18th, please indicate the date that you started studying and estimate the total number of hours that you spent studying **BEFORE** March 18th. Please leave blank if this does not apply to you.

4. Which of the following did you do to prepare for Exam 2? (check all that apply)
 - a. Re-watched lecture videos
 - b. Re-read lecture slides or class notes
 - c. Re-wrote your class notes word for word
 - d. Paraphrased or outlined class notes (includes creating a study guide or writing out answers to the provided study guides)

- e. Re-read textbook
- f. Answered the Problem Set questions
- g. Answered the old Exam questions
- h. Made my own diagrams or comparison tables from lecture notes
- i. Quizzed myself using ungraded weekly quizzes, quizlets, flashcards
- j. Attended the Review Session
- k. Explained concepts to myself or others
- l. Other

If you selected "Other" on the previous question, please explain: _____.

5. For the strategies that you selected on the previous question, fill in the percent of your total study time that you spent on each one. Altogether it should add up to 100%.

- a. Re-watched lecture videos
- b. Re-read lecture slides or class notes
- c. Re-wrote your class notes word for word
- d. Paraphrased or outlined class notes (includes creating a study guide or writing out answers to the provided study guides)
- e. Read textbook
- f. Answered Problem Set questions
- g. Worked on the old Exam questions
- h. Made my own diagrams or comparison tables from lecture notes
- i. Quizzed myself (using ungraded weekly quizzes, quizlets, flashcards) or had someone else quiz you
- j. Attended the Review Session
- k. Explaining concepts to yourself or others
- l. Other

6. Did you spend at least part of your time studying with other students? [yes/no]

7. Did you ask your instructor or one of the AIs for help (can include office hours, drop-in sessions, or study hall)? [yes/no]
8. Since the beginning of the semester, in a typical week about how many hours of sleep did you get each night?
9. Please fill in the number of hours you slept on each of the following nights. Use 15 minute increments (.25, .5, .75). Use a 0 if you did not sleep on a particular night. [Have 2 days with blanks next to them that students fill in.]
10. Since the beginning of the semester, in a typical week about how many days did you exercise?
11. Please fill in the number of hours you exercised on each of the following days. Use 15 minute increments (.25, .5, .75). Use a 0 if you did not exercise on a particular day. [Have 7 days with blanks next to them that students fill in.]
12. Since the beginning of the semester, in a typical week how would you rate your eating habits? [Very unhealthy, moderately unhealthy, slightly unhealthy, slightly healthy, moderately healthy, very healthy]
13. In the week before Exam 2, how would you rate your eating habits? [Very unhealthy, moderately unhealthy, slightly unhealthy, slightly healthy, moderately healthy, very healthy]

The following set of questions refer to the exam planning (given for Quiz VIII) and reflection exercises. Please consider answering these questions if you completed the exercise. Your feedback is appreciated and will inform future versions of the assignment.

14. Please rate each of the following according to how helpful it was:

[Not helpful, Slightly helpful, Moderately helpful, Very helpful, Extremely helpful]

Exam 2 Reflection Survey

Exam 2 Planning Exercise (Quiz VIII)

15. For the **Exam 2 Planning Exercise (Quiz VIII)**, why was it helpful (or not helpful)?

16. I followed through on my plan from the Exam 2 Planning Exercise... [Not at all, A little, Somewhat, Mostly, Completely]

Open response: In what ways did you follow through on your plan?

Open response: In what ways did you NOT follow through on your plan?

17. Please rate each of the following parts of the Exam 2 Planning Exercise according to how helpful it was:

[Not helpful, Slightly helpful, Moderately helpful, Very helpful, Extremely helpful]

- Selecting my most important habits to maintain
- Selecting my most important habits to change
- Making a specific plan
- The suggested strategies for making a good plan
- Making an If-Then commitment statement about overcoming an obstacle

Supplemental Material 2: Codebooks

Study Goals

Question 2: Think about the above list of suggested study habits. Which study habits will be most important for you to *change* for Exam 2? Write down 1-2 habits and explain why they are important to change.

- *Rationale:* Our rationale for coding which habits students wanted to change was so that we could look directly at students' self-reports of their intended behavior change in the exam 1 vs. exam 2 reflections. For example, if a student has a goal of distraction, we can look at the percent of the time that they reported being distracted while studying and see if this changed after the exam 2 planning exercise, relative to exam 1 distraction.
- *This codebook was a combination of inductive and deductive coding to align with the outcome variables with the exam 1 and 2 reflections.*
- *Overall Notes:*
 - Each individual could receive more than one code.

Categories for what habits will be important to change (Q2):

Implementation

- Study more (STm) – Student wants to, “study for more time” than they had for the previous exam. This should not be coded if they only mention the number of days in advance or more spacing (Contrast with “Starting earlier”). If students write something ambiguous like “amount of time”, it should NOT be coded here because it is unclear whether this means more or less time, and instead should be “Miscellaneous time.”
- Starting earlier (SE) – Student says they want to, “start studying earlier,” or, “spread studying over several days,” or cram/procrastinate less. This can also include “keeping up” with the course materials.
- Miscellaneous time (MT) – student says something about the timing of studying that is not covered by the categories above (e.g., “studying less”, “starting later”).
- Less distracted (DI) – student says they want to be less distracted/more focused than they were for the previous exam or mentions a specific strategy to limit distractions (e.g., “not studying when too tired,” “going to library to avoid distractions,” or, “putting away phone”).
- Studying in groups (Gm) – student mentions wanting to study with peers in any format (e.g., “I should work with others.”). Should be coded in addition to the specific study strategy if one is mentioned (e.g., explaining, quizzing). This can include BTL or study halls. Should NOT be coded if a student says they don't want to study in a group this time (instead code that as “Miscellaneous”).

- Different content (DC) – student mentions that they either studied the wrong content last time or that they want to focus more on certain content this time (e.g., “I want to focus on lectures instead of the textbook readings.”)

Active Strategies

- More Quizzing (Qm) – student mentions wanting to start or do more of any form of retrieval practice, including quizlets, quizzing, flashcards (e.g., “I want to quiz myself”). If a student mentions wanting to use quizzing more effectively (answering question before looking at the key), use the ASe code below.
- More Practice Problems (Pm) – student mentions wanting to start using or use more of the old exams or problem sets (e.g., “Doing practice problems”). If a student mentions wanting to use problem solving more effectively (doing the problems before looking at the solutions), use the ASe code below.
- More Organizing notes (Om) – student mentions wanting to “organize,” “rearrange,” “paraphrase,” or “outline” notes/ideas or make a study guide or visualizations such as mind/concept maps. Also includes if students say that they combined/compared notes from multiple sources (e.g., class notes and slides or provided study guides).
- More Explaining (Em) – student says they will explain, teach, or discuss concepts with themselves or others, or that they will make connections among different concepts from the class (e.g., “I should explain concepts to other people instead of just studying myself.”) This can include any specific mention of explanations that occur in BTL (the specifics of explanation must be stated).
- More active strategies (ASm) – student says they want to start doing or do more of an active strategy that does not fall into one of the above categories (e.g., “generating my own examples”). If improving implementation of the strategy, use ASe.
- Use active strategies more effectively (ASe) – student says that they want to use any active strategy more effectively. This can include improving notetaking habits, not looking at solutions/keys until after actually trying the problem, etc. (e.g., “I definitely need to try the problem sets before looking at the answer keys.”)
- Less active strategies (ASl) – student says they want to use less of any active strategy (e.g., “don’t spend too much time reorganizing lecture notes”).

Passive Strategies

- Less rereading (ReRI)– student says they want to do less of just re-reading notes or textbook or slides (e.g., “I re-read the slides too many times”).
- Less watching lecture (WLI) – students says that they want to spend less time re-watching lectures (e.g., “avoid only watching lecture videos for a day straight.”) If they state wanting to spend more time re-watching lecture, use More Passive Strategies (PSm) code, below.

- Less rewriting (ReNI) – Student specifically says that they want to do less of rewriting notes (e.g., “Not copying my notes word for word is important to change”). Contrast with “Organizing, paraphrasing, or outlining notes.” Additionally, if student says something like that they will be rewriting notes from memory, then code this as “Quizzing” instead.
- Less passive strategies (PSI) – student says they want to use less of a passive strategy not included above (e.g., “I highlighted too much of my notes”).
- More passive strategies (PSm) – student says they want to start doing or do more of a passive strategy or improve on a passive strategy (e.g., reviewing slides, notes, textbook, reading more carefully, re-watching lecture)

Misc.

- Miscellaneous (M) – Anything not covered by the above categories (e.g., attending review session, staying motivated, being efficient/productive) or says something related to study strategies but that cannot be clearly categorized into the above codes (e.g., generically mentions changing strategies).
- Nothing (U) – student did not want to change anything
- None (N) – Student completed the planning exercise but left this question blank

Study Obstacle

Question 7 consists of students' implementation intentions. Question 8 is a cognitive rehearsal of overcoming that obstacle.

Question 7: First, think of one major obstacle that could prevent you from sticking with the plan that you just made. Then, commit to overcoming this obstacle by writing an If-Then statement...

IF [obstacle]: 7A

THEN I will [solution]: 7B

Question 8: To finish this planning exercise:

- A) **Vividly imagine the scenario when you are likely to encounter the obstacle that you just stated. Now, write down details about this scenario, such as where you are, what is going on, how you are feeling, etc.**
 - B) **Last, continue to imagine yourself in that scenario, but also imagine yourself doing actions to follow through on your plan. Now, write down a few details that you just imagined about following through on your plan.**
- *Rationale:* Our rationale for coding the obstacle category was so that we can look directly at students' self-reports of their obstacle behavior in the exam 1 vs. exam 2 reflections. This is the closest proximal variable to follow-through. For example, if a student has an obstacle of distraction, we can look at the percent of the time that they reported being distracted while studying and see if this changed after the exam 2 planning exercise, relative to exam 1 distraction.
 - *Inclusion Criteria:* Students completed Exam 2 planning exercise in the study habits group (n=246).
 - *Citations:* These obstacles fit into the failure-to-act framework from (Gollwitzer & Sheeran, n.d., 2006).
 - *Overall Notes:*
 - Each individual received a single code. We focused on the IF portion of the implementation intention for this coding (Question 7A), but occasionally referred to their visualization (Question 8A).

FAILING TO GET STARTED (Code: S)

- This obstacle category includes not remembering to get starting, not seizing the opportunity to act, and procrastinating.
 - Example 1: "I get lazy,"
 - Example 2: "It's hard to devote time to studying. I only have an hour between my classes and practice."
 - Example 3: "I'm tempted to cancel my study time..."

GETTING DE-RAILED (Code: D)

- This obstacle category involves the inability to shield goal striving from unwanted distractions, such as paying attention to unwanted stimuli (e.g., phones).

Students often said that their obstacle is distraction, phone usage, app usage, etc. Importantly, this derailment is **after** studying has already started “during studying.” (This is separate from getting distracted from getting started on a study session, Code S.)

- Example 1: “I’m tempted to check my phone”
- Example 2: “If I am tempted to stop studying to do something with friends”
- Example 3: “I get distracted by technology in my room”

NOT HALTING WHEN THINGS ARE UNPRODUCTIVE (Code: R)

- This obstacle category includes the reluctance or inability to revise the plan once it has begun. This may include “falling behind,” or reluctance to follow through on an effective plan once it has begun. (This is separate from the initial reluctance to begin following through, Code: S.) Additionally, it may refer to a student who describes eventually halting their plan after a period of not halting when ineffective.
- Example 1: “After a while I realize that my plan was unrealistic”
- Example 2: “I have prioritized other classes and fell behind”
- Example 3: “I spent too much time making an outline”

OVEREXTENDING ONESELF (Code: O)

- Student may say that their obstacle is some internal state or some affect (e.g., overwhelmed, confused, lost, stressed, sad, etc.) due to overextension.
- Example 1: “I am feeling stressed out.”
- Example 2: “I feel overwhelmed from my other classes.”
- Example 3: “I start to feel nervous.”

Plan Alignment, Specificity and Viability

- *Rationale:* Our rationale for looking at the quality of plans is to ask whether it is a moderator of success in following through. We looked at two discrete dimensions of quality: alignment and specificity. As one component of specificity, we also examined the viability of the plan.
- *Inclusion Criteria:* We looked exclusively at the implementation intention plans of students who listed distraction as their obstacle and reported distraction levels while studying for exams 1 and 2 (n=91).
- *Citations:* (Gollwitzer & Sheeran, n.d.; van Osch et al., 2010)
- *Overall Notes:* Each response was assigned a numerical score for alignment and four dimensions of specificity, as listed below. Both Q7 and Q8 responses were read to assign these scores.

ALIGNED (I.E., INSTRUMENTAL) - Will overcoming the obstacle that a student states help them achieve the goal outcome stated in earlier in the exercise (Question 4)?

- No = 0, Yes = 1

- Example of Yes, 1: Goal, “Quizzing more,” Obstacle, “I get distracted by my phone”
- Example of No, 0: Goal, “Start studying earlier,” Obstacle, “I have been studying for an hour and my phone buzzes so I pick it up.”
 - Distraction while studying is not an aligned obstacle for wanting to start earlier because it is describing getting de-railed during a study session that has already started.

PRECISION or SPECIFICITY and VIABILITY, Sum of 4 dimensions:

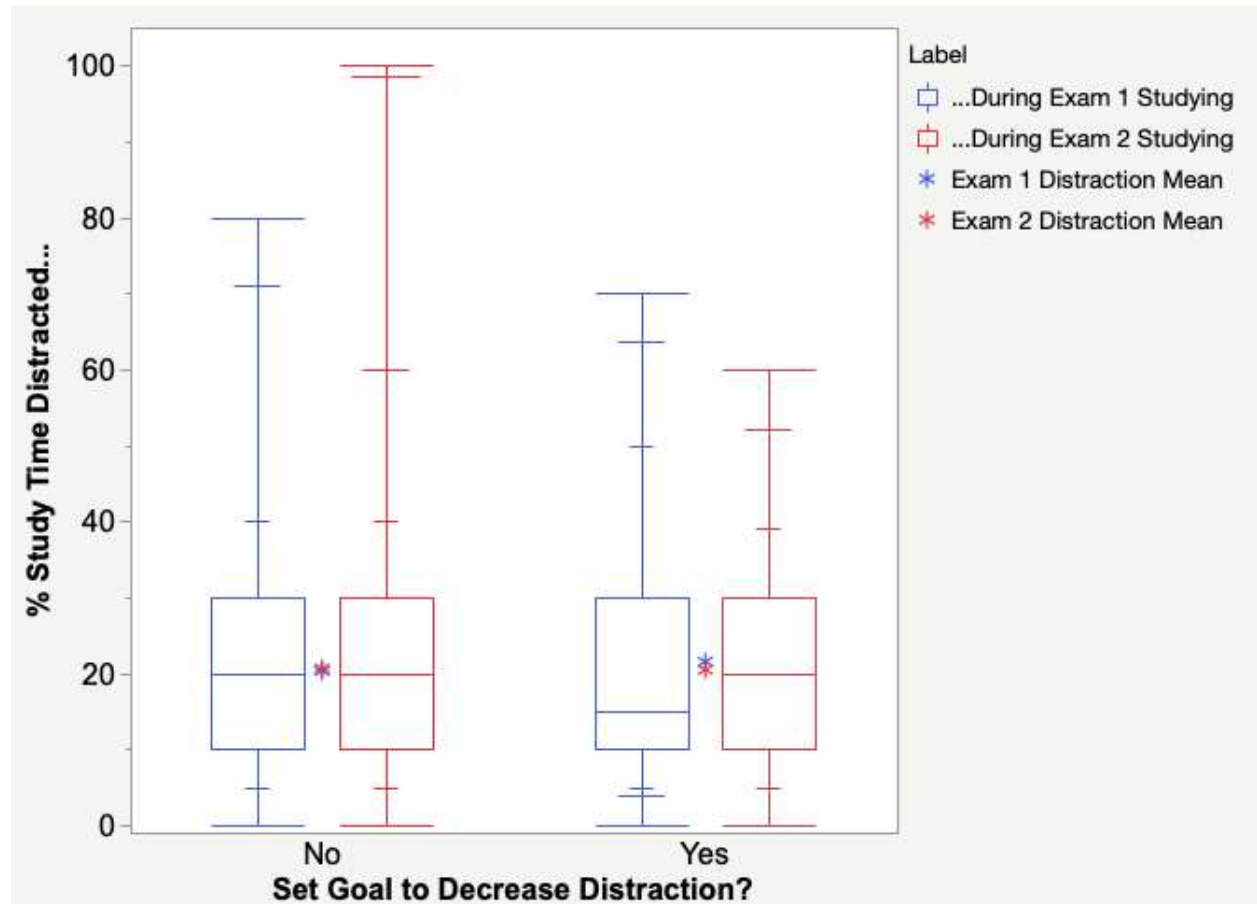
- **When will the obstacle occur? –**
 - 0 absent or 1 present
 - Examples of 1, present: “After an hour of studying...,” “Tomorrow after practice.”
- **Where will the student be when the obstacle or solution occurs? -**
 - 0 absent or 1 present
 - Examples of 1, present: “in the study room,” “in the basement of Olin.”
- **How will the student overcome the obstacle? -**
 - 0 solution not stated with sufficient detail that someone else could carry out the solution,
 - Example solution to getting distracted by phone: “I will study.”
 - 0.5 only one specific detail given about the solution,
 - Example solution to getting distracted by others, “come up with some excuse to leave.”
 - 1 multiple specific details given about the solution,
 - Example solution to getting distracted by a text: “After I see this message pop up, I want to text this person back but I resist by putting my notifications on do not disturb. Then I no longer can get notifications that people have texted me and I no longer will be reminded of my phone.”
- **Can the student realistically initiate the solution action immediately after the obstacle is encountered?**
 - No = 0, Yes = 1
 - The student must initiate the solution, rather than depend on someone else to initiate the solution.
 - Example of 0/No: “From that point on, I’ll make my sister either hide my phone somewhere in her apartment or make her take my phone to work.”
 - The solution has to be realistic.
 - Example of 0/No: “I will break my phone.”
 - The solution must occur after the obstacle, rather than before the obstacle.
 - Example of 0/No: “Remember to leave my phone in my room before I start studying [after describing getting distracted during studying]”

Appendix 1: Works Cited

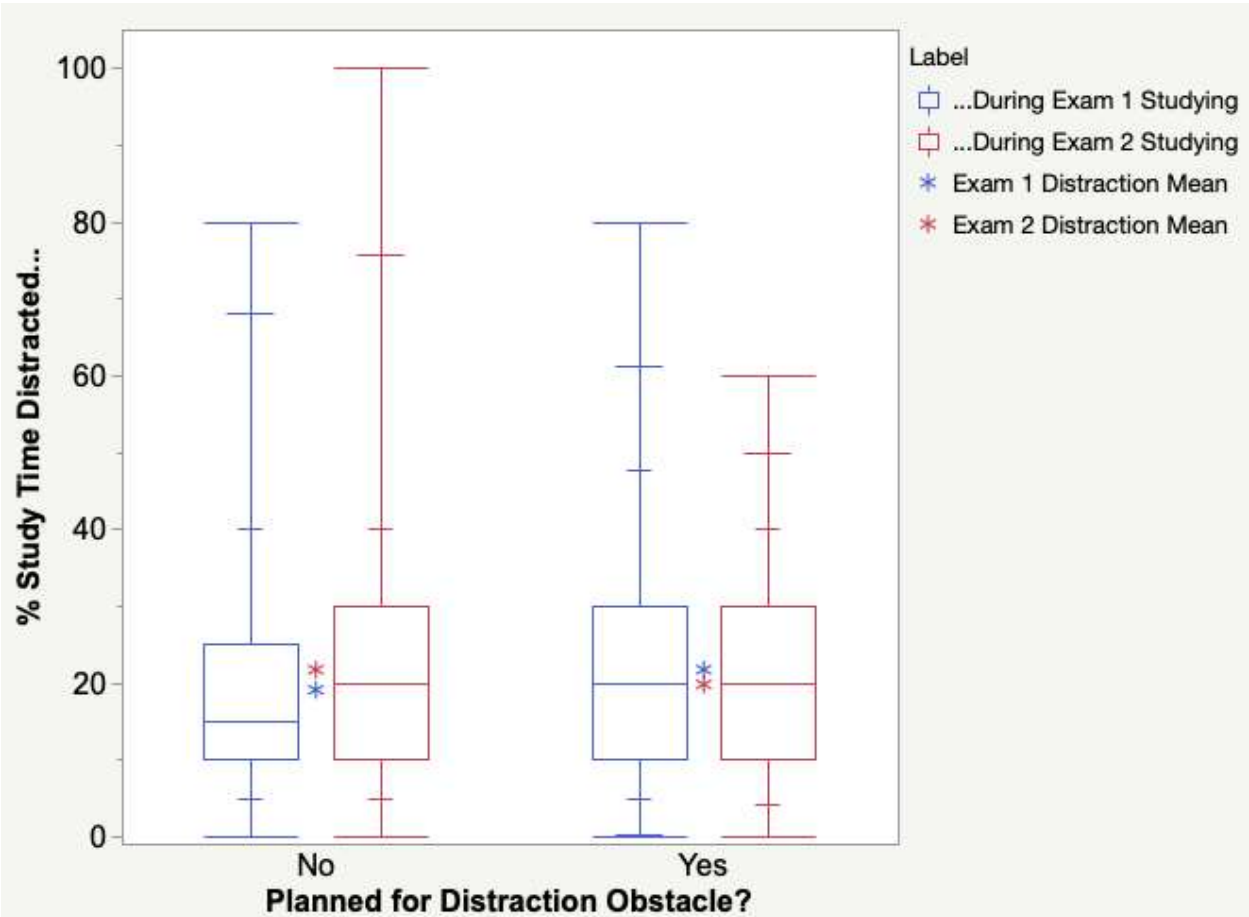
- Gollwitzer, P. M., & Sheeran, P. (n.d.). Implementation Intentions | Division of Cancer Control and Population Sciences (DCCPS). Retrieved December 16, 2022, from <https://cancercontrol.cancer.gov/brp/research/constructs/implementation-intentions>
- Gollwitzer, P. M., & Sheeran, P. (2006). Implementation Intentions and Goal Achievement: A Meta-analysis of Effects and Processes. *Advances in Experimental Social Psychology*, *38*, 69–119.
- van Osch, L., Lechner, L., Reubsaet, A., & de Vries, H. (2010). From theory to practice: An explorative study into the instrumentality and specificity of implementation intentions. *Psychology & Health*, *25*(3), 351–364.

Supplemental Tables and Figures

Supplemental Figure 1: Quantile box plots showing the percent of exam 1 and exam 2 study time distracted based on whether a student set a goal to decrease distraction. The means are shown with stars. The mean exam 1 study time distracted (blue) was nearly overlapping with the mean exam 2 study time distracted (red) in both groups, reinforcing the result in Table 1 that setting the goal to decrease distraction was not a significant predictor of follow-through.



Supplemental Figure 2: Quantile box plots showing the percent of exam 1 and exam 2 study time distracted based on whether a student planned for a distraction obstacle. The means are shown with stars. The mean exam 2 study time distracted (red) was lower than the mean exam 1 study time distracted (blue) in the group that planned for a distraction obstacle; whereas, the mean exam 2 study time distracted (red) was higher than the mean exam 1 study time distracted (blue) in the group that did not plan for a distraction obstacle. This reinforces the result in Table 2 that planning for a distraction obstacle was a significant predictor of follow-through.



Supplemental Table 1: Distraction Obstacle Frequency by Study Goal

For each study goal, the proportion of students who listed a distraction obstacle was calculated. This is summarized in the table below. Study goal categories correspond to Table 1.

Study Goal	Total Count	Count With Distraction Obstacle	Proportion with Distraction Obstacle
Starting earlier (Study spacing)	93	39	0.419
Less distracted	62	35	0.565
Study in groups	16	6	0.375
More organizing notes	29	8	0.276
More practicing problems	26	14	0.539
More explaining	18	10	0.556
More quizzing	12	3	0.250
Less re-reading	46	20	0.435
Less re-writing	11	4	0.364
Less misc. passive strategies	10	3	0.300

Use active strategies more effectively	39	18	0.462
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