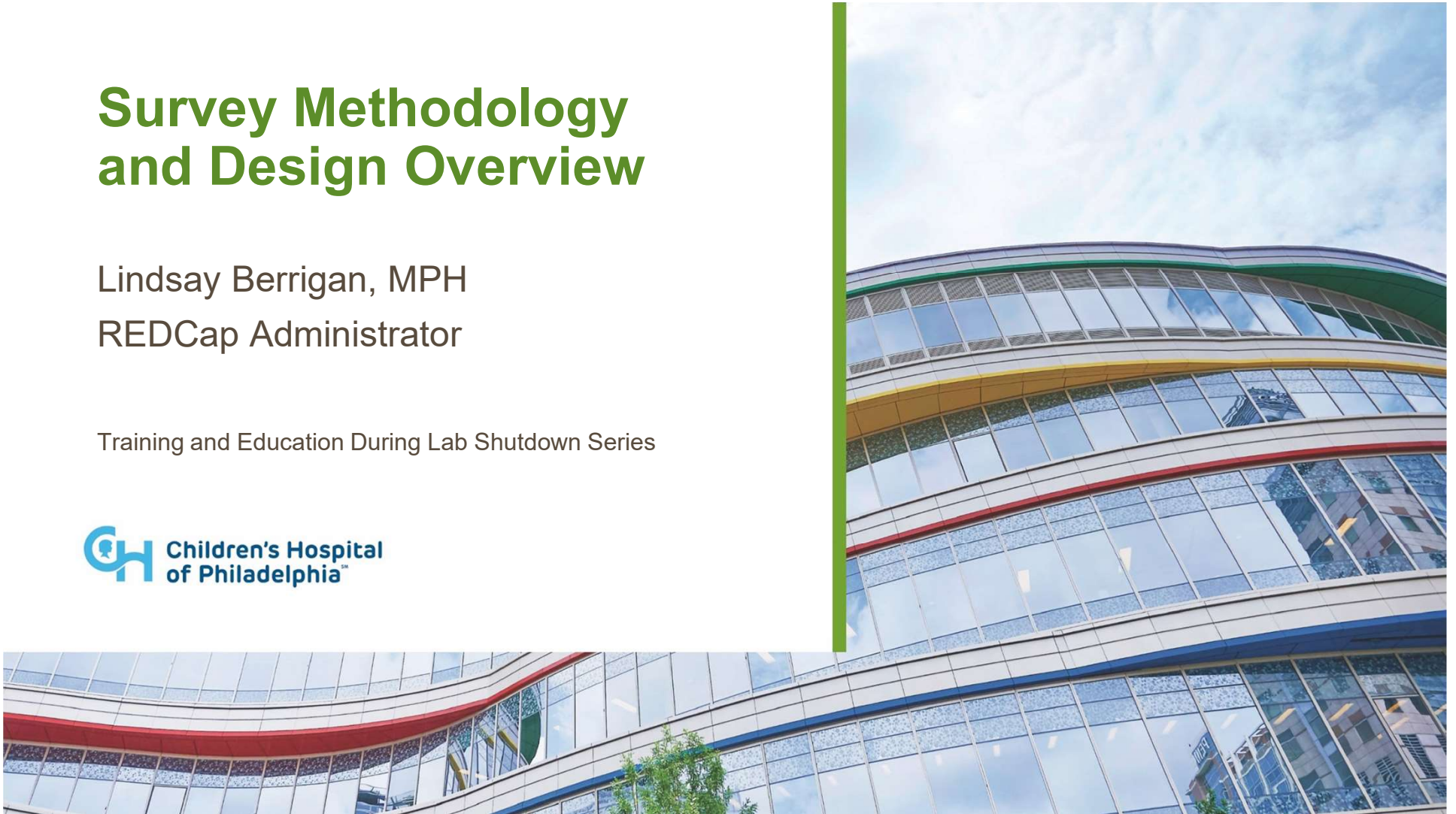


# Survey Methodology and Design Overview

Lindsay Berrigan, MPH  
REDCap Administrator

Training and Education During Lab Shutdown Series



## Learner Outcomes

By the end of this presentation, learners will be able to:

- Understand the survey development process
- Think critically about question stem design, response design, and visual design
- Implement some design tenets in REDCap

## Why do we need good surveys?

- To obtain truthful, accurate and useful data
- Survey fatigue is real!
- Combatting nonresponse - making surveys easy-to-answer
- Question wording can dramatically impact responses
- Surveys and self-reports are inherently imperfect – so we need to do the best we can on our end

Robinson, S. B., & Leonard, K. F. (2018). *Designing quality survey questions*. Sage Publications.

# Survey Development - A Model to Follow

## 1. Planning and predrafting

- a. Determining and articulating survey purpose
- b. Understanding what surveys can measure
- c. Understanding survey respondents

## 2. Developing questions

- a. Sourcing questions
- b. Crafting question stems and response options

Most of this presentation  
focuses on this step

## 3. Finalizing

- a. Pretesting
- b. Preparing for administration, analysis and use

Robinson, S. B., & Leonard, K. F. (2018).  
*Designing quality survey questions*. Sage  
Publications.

# Survey Development - A Model to Follow

Keep in mind

- There's no one “right” way to develop an instrument
- The process is iterative
- It won't be “perfect” - do your best!

## Survey Development - Planning And Predrafting

- Survey development starts at project planning stage
- We tend to think at the question-development and question-editing stage
  - This is often where we can be most helpful as REDCap Admins
  - But often this is too late!

# Survey Development - Planning And Predrafting

- Analysis plan should be in place BEFORE completing instrument development.
  - NIH moving toward requiring analysis plans
- The goal is **not** to collect everything possible and decide later what you want to use!
- Goal is to collect what you need
  - This will also limit response burden on participants and get you better quality data

# Survey Development - Planning And Predrafting

Have you asked yourself:

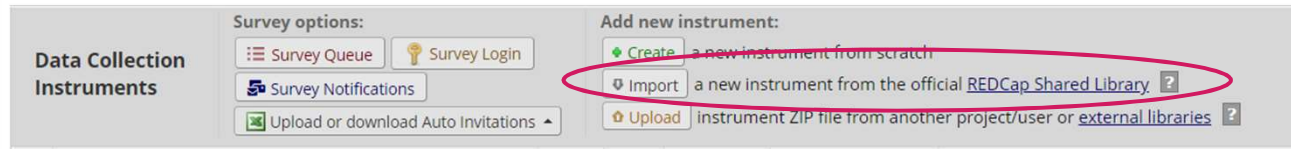
- Is a survey the right tool for my type of data collection?
- Have I considered key informant interviews? Focus groups?
- If a survey is the right tool – is there an existing tool I can use?



# Survey Development - Planning And Predrafting

Places to find instruments and questions:

- REDCap shared library



- Literature review for instruments previously used (will need to ask permission to use)
- Fellow researchers at CHOP

# Survey Development - Planning And Predrafting

## Constructs and indicators

- **constructs** are things to be measured that cannot be directly observed
- **indicators** tell us the state or level of something, and they are how we measure constructs
  - **construct** → satisfaction
  - **indicator** → they liked the training, they found the materials helpful or useful, they would recommend, etc.

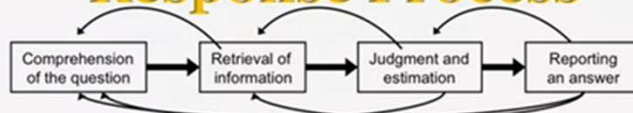
Babbie, E. R. (1990). Survey research methods  
Wadsworth Pub. Co Belmont, Calif, 3(9).

# Response Process

## 02.01 Response Process: Comprehension

QUESTIONNAIRE DESIGN  
FOR SOCIAL SURVEYS **M**

### Simple Model of the Response Process



- Processes are sequential although R can backtrack
- Models ideal performance, but Rs:
  - may misunderstand question
  - may not not record (“encode”) relevant events in memory
  - may forget relevant events
  - may take shortcuts: satisficing, acquiescence
  - may intentionally misreport: social desirability

© 2014 Frederick Conrad and JFSM/MFSM

2

Tourangeau, R., Rips, L. J., & Rasinski, K. (2000). *The psychology of survey response*. Cambridge University Press.

**Next slide shows a real-life example of response process**

How often do you have a drink containing alcohol?

- ☐ Never
- ☐ Monthly or less
- ☐ 2 to 4 times a month
- ☐ 2 to 3 times a week
- ☐ 4 or more times a week

OK a drink containing alcohol – a beer, wine, or a cocktail **COMPREHENSION**

I used to drink a few times a week, but in the past few months it's been more like once a week. Usually I'll have more than one drink at that one sitting. **RETRIEVAL**

Does that still count as “having a drink containing alcohol” if it's more than one? **BACK TO COMPREHENSION**

OK, I'll count having two drinks as “having a drink containing alcohol”. So let's say I do that once a week. Once a week has got to be on this list of choices.....**RESPONSE**

OK it's not. Well my answer definitely isn't “monthly or less” or “4 or more times a week”....how about 2-4 times a month? That's not really accurate either, though. **JUDGMENT**

But 2-3 times a week is the second highest one! That seems bad, it makes it seem like I drink a lot. I don't, so there's no way I'm in the SECOND HIGHEST CATEGORY! That's obviously not what they mean by that choice. Why isn't there a once a week option? **JUDGMENT**

OK I'll pick 2 to 4 times a month - that seems closest to right **RESPONSE**

**OK, so you thought about all that stuff - and now you do need to create some questions!**

## 1. Planning and predrafting

- a. Determining and articulating survey purpose
- b. Understanding what surveys can measure
- c. Understanding survey respondents

## 2. Developing questions

- a. Sourcing questions
- b. Crafting question stems and response options ← **We are here!**

## 3. Finalizing

- a. Pretesting
- b. Preparing for administration, analysis and use

## Measurement Error

- Bias
  - Respondents misreport in the same direction
- Variance
  - Respondents are all over the map when answering questions
  - Issue with clarity of question



# Question Stem Design

The question stem refers to the question itself – what we would refer to as the Field Label in REDCap

## Question Stem Design

- A survey question should be worded so that every respondent is answering the same question
- Words should be chosen so that all respondents understand their meaning
- If words must be used that have meanings that are unlikely to be shared by all respondents, **definitions should be provided**
  - This may not mean just for “difficult” words, but for common words to ensure everyone is thinking of the same thing

# Question Stem Design

## Options for providing definitions

### 1. Define in the question

3) **Infant-only seats are rear-facing, portable seats that come with a handle. They are often installed into vehicles with a base and can be compatible with strollers.**

☐ Yes

☐ No

**Does your child use an infant-only seat?**

# Question Stem Design

## Options for providing definitions

### 2. Inline Descriptive Pop-Ups External Module

products.

twice

Rear-facing, portable seats that come with a handle. Often installed into vehicles with a base and can be compatible with strollers.

2) Does your child use an infant-only seat? ☐ Yes ☐ No

1. Link Text:

1. Pop-up Text:

Rear-facing, portable seats that come with a handle. Often installed into vehicles with a base and can be compatible with strollers.

# Question Stem Design - Things to Avoid

## Ambiguous wording

- Instead of: **How many years have you been employed in your current job?**
- Define what you're interested in: **We want to know only about your current position or job title. How many years have you been employed in your current position?**

## Question Stem Design - Things to Avoid

### Numerous logical operators (connecting words like *and*, *but*, *or*, and *if*)

- These are taxing for respondents
- Instead of: **How many times in the last 6 months have you or any of your family members [including parents, children, and any others living in your home or staying with you] visited a health care or other medical facility?**
- Define the terms first: Family members include parents, children, and any others living in your home or staying with you. Medical facility includes any place you visit to receive health care. **How many times in the last 6 months have you or any family members visited a medical facility?**
- This also helps take care of the ambiguous wording!

# Question Stem Design - Things to Avoid

## Leading/loading questions

- Can introduce bias (especially in case of social desirability)
- Often these are easy-to-spot/common sense, but more subtle ones can be difficult
- Instead of:

Did you vote in the 2016 presidential election?

- Implies that the correct choice is yes

- There are lots of things you could do to improve!



Improvements on next slide

# Question Stem Design - Things to Avoid

- **Leading/loaded questions**

- Use forgiving wording and give people several options:

In talking to people about elections, we often find that a lot of people were not able to vote because they weren't registered, they were sick, or they just didn't have time. Which of the following statements best describes you?

- **I did not vote (in the election this November)**
    - **I thought about voting this time, but didn't**
    - **I usually vote, but didn't this time**
    - **I am sure I voted**

American National Election Studies  
(ANES) Survey, 2016



# Question Stem Design - Things to Avoid

## Double (or triple) barreled questions

**How knowledgeable and helpful was the nurse on your recent telehealth visit?**

- ☐ Excellent
- ☐ Good
- ☐ Fair
- ☐ Poor

- This is asking two different questions in one
- also could greatly improve answer choices - (more on that later)

Improvements on next slide

# Question Stem Design - Things to Avoid

Fixing double barreled questions - separate them out:

**How knowledgeable was the nurse on your recent telehealth visit?**

- ☐ Not at all knowledgeable
- ☐ Slightly knowledgeable
- ☐ Moderately knowledgeable
- ☐ Quite knowledgeable
- ☐ Extremely knowledgeable

**How helpful was the nurse on your most recent telehealth visit?**

- ☐ Not at all helpful
- ☐ Slightly helpful
- ☐ Moderately helpful
- ☐ Quite helpful
- ☐ Extremely helpful

# Response Design

Designing the answer choices is as important as designing the questions

# Response Design

## Most important thing:

- Make sure the responses match the question stem!
- We see mismatches frequently in REDCap

Were you greeted with a smile?

☐ Excellent

☐ Good

☐ Fair

☐ Poor

☐ N/A

6: \*Please rate how understandable this site's information is.

1=Poor      Excellent=10

1 2 3 4 5 6 7 8 9 10

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Overall, how satisfied are you with your experience as a [redacted]?

Strongly disagree      Disagree      Neutral      Agree      Strongly agree

☐ ☐ ☐ ☐ ☐

2. Please indicate how useful the following content will be to your work going forward.

	Strongly Agree	Agree	Disagree	Strongly Disagree
The use of student surveys in the context of the [redacted] grant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The research on the validity and reliability of student surveys	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The continuum of student surveys	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Response Design

	Excellent	Very good	Fair	Poor
) How knowledgeable was the nurse on your recent telehealth visit?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
) How helpful was the nurse on your recent telehealth visit?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
) What was your level of satisfaction with your recent telehealth visit?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- It seems easy and organized to pull everything into a simple matrix - but you won't be getting the best data you can get this way
- It's best to separate out the questions so they are each answered individually

# Response Design

How knowledgeable was the nurse on your recent telehealth visit?

- ☐ Not at all knowledgeable
- ☐ Slightly knowledgeable
- ☐ Moderately knowledgeable
- ☐ Quite knowledgeable
- ☐ Extremely knowledgeable

How helpful was the nurse on your most recent telehealth visit?

- ☐ Not at all helpful
- ☐ Slightly helpful
- ☐ Moderately helpful
- ☐ Quite helpful
- ☐ Extremely helpful

What was your level of satisfaction with the telehealth visit?

- ☐ Very dissatisfied
- ☐ Somewhat dissatisfied
- ☐ Neither satisfied nor dissatisfied
- ☐ Somewhat satisfied
- ☐ Very satisfied

Questions separated out with matching answer choices

# Response Design - Don'ts and Fixes

## DON'T: Use agreement-based responses

(strongly disagree - strongly agree scale)

Agreement-based responses are SUPER popular, so this may come as a surprise!

Some of the issues with agreement scales:

- They don't emphasize the construct being measured
- Prone to acquiescence
- May encourage respondents to think through responses less thoroughly

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: the tailored design method*. John Wiley & Sons.  
Krosnick, J. A. (1999). Survey research. *Annual review of psychology*, 50(1), 537-567.  
Tourangeau, R., Rips, L. J., & Rasinski, K. (2000). *The psychology of survey response*. Cambridge University Press.

# Response Design - Don'ts and Fixes

What to do instead of agreement-based scales:

- Use construct-specific response anchors

I am worried that I or someone in my family will get sick from coronavirus.

- ☐ Strongly agree
- ☐ Agree
- ☐ Neither agree nor disagree
- ☐ Disagree
- ☐ Strongly disagree

Agreement-based, unspecific ❌

Answer choices  
match question



How worried, if at all, are you that you or someone in your family will get sick from coronavirus?

- ☐ Very worried
- ☐ Somewhat worried
- ☐ Not too worried
- ☐ Not worried at all



# Response Design - Don'ts and Fixes

Including Don't Know as an option: **current research says not to include**

04.05 Attitude Questions: Don't Know

QUESTIONNAIRE DESIGN  
FOR SOCIAL SURVEYS **M**

## Krosnick's Verdict

(Krosnick and Presser, 2010; Krosnick, 2012)

1. DKs are mostly not due to complete lack of information.
2. DKs are mostly due to ambivalence, unclear questions, intimidation, self-image protection, and satisficing.
3. The best questionnaire design strategy appears to be omitting DK filters and telling respondents: "I'll note that, but if you had to choose, would you say..."
4. The result will be collecting informative data from a larger proportion of your sample.

Make sure your responses are ***exhaustive*** and ***mutually exclusive***

- **Exhaustive** – Cover the full range of expected answers
- **Mutually exclusive** – Do not overlap

Variable: telehealth\_freq\_bad

About how many times per year do you have telehealth visits?

- ☐ This was my first one
- ☐ About once a year or less
- ☐ About three times a year
- ☐ About five times a year
- ☐ About 10 or more times per year

reset



Not exhaustive ❌

Variable: telehealth\_freq

About how many times per year do you have telehealth visits?

- ☐ This was my first one
- ☐ About 1 time per year or less often
- ☐ About 2-4 times per year
- ☐ About 5-7 times per year
- ☐ About 8-10 times per year
- ☐ About 11 or more times per year

reset



Exhaustive - covers all options 😊

# Response Design

## Think about your frequency scales

- Research has shown that respondents presented with “medium frequency” response options reported “significantly fewer target events than those presented with high frequency options”
- What does this mean in reality?

Meadows, K. A., Greene, T., Foster, L., & Beer, S. (2000). The impact of different response alternatives on responders' reporting of health-related behaviour in a postal survey. *Quality of Life Research*, 9(4), 385-391.

# Response Design

## Think about your frequency scales

How often do you feel sad?

- ☐ About once per year
- ☐ A few times per year
- ☐ At least once per month
- ☐ At least once per week

Low-frequency response options: respondents are more likely to interpret sadness as a major event (loss of a loved one, etc.)

How often do you feel sad?

- ☐ About once per month
- ☐ A few times per month
- ☐ At least once per week
- ☐ Several times per week
- ☐ At least once per day

Medium-frequency response options: respondents are more likely to interpret sadness as a minor event (watching a sad movie)

# Visual Design

How your questions and responses are presented visually can affect the answers you get

## Visual Design

### DON'T: Label only endpoints of response options

How efficient did you find the telehealth visit?

☐ Not efficient at all

☐

☐

☐

☐ Extremely efficient

Leaves the unlabeled responses open for interpretation ❌

Increases likelihood of similar interpretation 😊

How efficient did you find the telehealth visit?

☐ Not efficient at all

☐ Slightly efficient

☐ Moderately efficient

☐ Quite efficient

☐ Extremely efficient

## Visual Design

### DON'T: Unequally space response options

How knowledgeable was the nurse on your recent telehealth visit?

☐ Not at all knowledgeable   ☐ Slightly knowledgeable   ☐ Moderately knowledgeable   ☐ Quite knowledgeable   ☐ Extremely knowledgeable

Confusing and  
unequal  
spacing ❌

Much easier to  
read, and all  
options get equal  
space 😊

How knowledgeable was the nurse on your recent telehealth visit?

☐ Not at all knowledgeable  
☐ Slightly knowledgeable  
☐ Moderately knowledgeable  
☐ Quite knowledgeable  
☐ Extremely knowledgeable

# Visual Design

4) How efficient did you find the telehealth visit?

Not efficient at all	Slightly efficient
Moderately efficient	Quite efficient
Extremely efficient	

reset

Strange order and spacing with horizontal alignment ❌

Vertical alignment is generally better 😊

4) How efficient did you find the telehealth visit?

Not efficient at all
Slightly efficient
Moderately efficient
Quite efficient
Extremely efficient

reset



## Visual Design

You can change alignment using the Custom Alignment dropdown in the Online Designer



The image shows a user interface for the Online Designer. It features a 'Custom Alignment' dropdown menu with the following options: 'Right / Vertical (RV)', 'Right / Horizontal (RH)', 'Left / Vertical (LV)', and 'Left / Horizontal (LH)'. The 'Right / Vertical (RV)' option is currently selected and highlighted in blue. Below the dropdown, there is a 'Field Note (optional)' section with a text input field and a label 'Small reminder text displayed'.

**Custom Alignment**  
Align the position of the field

**Field Note** (optional)  
Small reminder text displayed

Right / Vertical (RV) ✓  
Right / Vertical (RV)  
Right / Horizontal (RH)  
Left / Vertical (LV)  
Left / Horizontal (LH)

# Visual Design

Matrix choices can  
space unevenly

Sometimes rotating  
matrix response  
choices can help

About how many hours per weekday (Monday through Friday) do you spend doing the following activities?

	<i>Less than 30 minutes</i>	<i>more than 30 minutes but less than 1 hour</i>	<i>more than 1 hour but less than 2 hours</i>	<i>more than 2 hours</i>
5) Lightly exercising (this can include anything where you are not sweating and can hold a conversation throughout the activity)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6) Watching television (this can include traditional cable television as well as Netflix, Hulu, and all other streaming services watched on a television, tablet or mobile device)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7) Reading books	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

reset

reset

reset

## Visual Design

Code to rotate matrix response choice text:

```
<div style="transform: rotate(-90deg); -webkit-transform: rotate(-90deg);  
-moz-transform: rotate(-90deg); -ms-transform: rotate(-90deg); white-  
space: nowrap; position: relative; top: -40px; left: -7px; margin-top:  
50px;">Response Here</div>
```

Play with the degrees and the margins to get what you want

# Visual Design

Can also insert line breaks in matrix responses

About how many hours per weekday (Monday through Friday) do you spend doing the following activities?

	Less than 30 minutes	More than 30 minutes but less than 1 hour	More than 1 hour but less than 2 hours	More than 2 hours
8) Lightly exercising (this can include anything where you are not sweating and can hold a conversation throughout the activity)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
				<a href="#">reset</a>
(this can include television as well as all other streaming on a television, vice)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
				<a href="#">reset</a>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
				<a href="#">reset</a>

## Matrix Column Choices

Choices (one choice per line) [Copy existing choices](#)

- 1, Less than 30 minutes
- 2, More than 30 minutes <br> but less than <br> 1 hour
- 3, More than 1 hour <br> but less than <br> 2 hours
- 4, More than 2 hours

[How do I manually code the choices?](#)

## Visual Design

**DON'T:** Place nonsubstantive response options together with substantive response options

How many weekdays (Monday through Friday) during a typical week do you ride your bicycle to work?

- ☐ 1 day
- ☐ 2 or 3 days
- ☐ 4 or 5 days
- ☐ not applicable

Improvement on next slide

## Visual Design

Add a double line break in your choices using HTML

28) How many weekdays (Monday through Friday) during a typical week do you ride your bicycle to work?

- ☐ 1 day
- ☐ 2 or 3 days
- ☐ all 5 days
- ☐ not applicable

Choices (one choice per line)

[Copy existing choices](#)

```
1, 1 day  
2, 2 or 3 days  
3, all 5 days <br> <br>  
6, not applicable
```

## Visual Design

However - line break method doesn't work with enhanced boxes

23) How many weekdays (Monday through Friday) during a typical week do you ride your bicycle to work?

1 day

2 or 3 days

all 5 days

not applicable

reset

You may have to use your best judgement if administering surveys on phones

## Next Steps

- Let me know any specific questions you have! I may not know now but I can research for you!
- If you're working on a survey currently, we can do a design consult
- Contact me at
  - [berriganl@email.chop.edu](mailto:berriganl@email.chop.edu)
  - [redcap@email.chop.edu](mailto:redcap@email.chop.edu) → reaches entire REDCap team