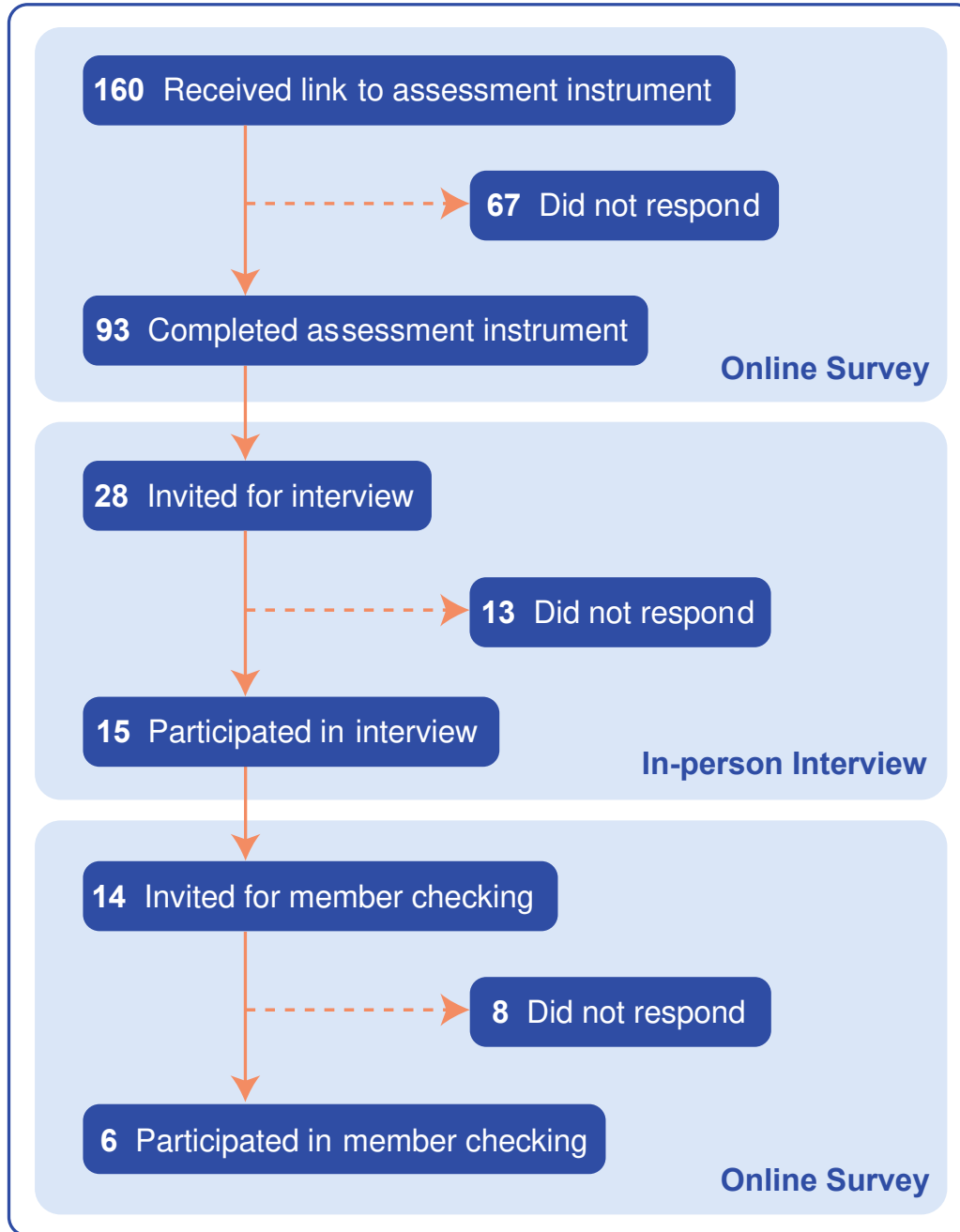


**ONLINE APPENDICES**

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**Appendix 1. Flow diagram depicting the participation of resident physicians**

## Appendix 2. Scenario development

Decision-making principle: **Relative Risk Bias**

Scenario presented to online MTurk participants (randomly assigned to presentation 1 or 2)

Presentation 1:

You have a newly diagnosed lung cancer. As your physician, I recommend that you select either Procedure A or Procedure B. Both procedures are equally effective but have different risks. Procedure A usually works and 20% of patients experience a complication. Procedure B may work and 10% of patients experience a complication.

Which option will you choose?

- A. Procedure A**
- B. Procedure B

\*represents choice selected by the majority of MTurk users

-OR-

Presentation 2:

You have a newly diagnosed lung cancer. As your physician, I recommend that you select either Procedure A or Procedure B. Both procedures are equally effective but have different risks. Procedure A usually works to solve the problem while Procedure B may work. Procedure A is twice as likely to cause a complication as Procedure B.

Which option will you choose?

- A. Procedure A
- B. Procedure B\***

\*represents choice selected by the majority of MTurk users

Scenario presented to all resident physicians

Scenario: You have a newly diagnosed lung cancer. As your physician, I recommend that you select either Procedure A or Procedure B. Both procedures are equally effective but have different risks. Both procedures are equally effective but have different risks.

Presentation 1:

Procedure A usually works and 20% of patients experience a complication.  
Procedure B may work and 10% of patients experience a complication.

Presentation 2:

Procedure A usually works to solve the problem while Procedure B may work. Procedure A is twice as likely to cause a complication as Procedure B.

As compared to Presentation 1, Presentation 2 increases the likelihood that the patient will choose:

- A. Procedure A
- B. Procedure B\***
- C. Does not influence the likelihood that patient will choose either option.

\*represents correct answer based on prior literature and validation by MTurk users

**Appendix 3. Characteristics of Amazon Mechanical Turk (MTurk) participants**

<b>Characteristic</b>	
Sample Size	269
Age, mean (SD)	32.0 (10.3)
Gender, n (%)	
Male	101 (37.5%)
Female	168 (62.5%)
Race, n (%)	
White and/or Caucasian American	209 (77.7%)
Black and/or African American	17 (6.3%)
Asian and/or Asian American	11 (4.1%)
Other	32 (11.9%)
Ethnicity, n (%)	
Hispanic	25 (9.3%)
Non-Hispanic	244 (90.7%)
Education, n (%)	
None	1 (0.4%)
High school graduate or GED	99 (36.8%)
Some college, no degree	6 (2.2%)
Associate's degree	12 (4.5%)
Bachelor's degree	117 (43.5%)
Master's degree	26 (9.7%)
Doctorate or professional degree	8 (3.0%)
Employment status, n (%)	
Employed	179 (66.5%)
Self-employed	15 (5.6%)
Unemployed	20 (7.4%)
Stay-at-home parent	20 (7.4%)
Retired	6 (2.2%)
Student	29 (10.8%)

#### Appendix 4. Validation results from Amazon Mechanical Turk (MTurk)

##### 3A. Scenarios presented to all MTurk Participants (n=269)

Principle		Option A	Option B	p-value
<b>Default Effect</b>	n (%)	249 (93%)	20 (7%)	<0.001*
<b>Endowment Effect</b>		112 (42%)	157 (58%)	0.01**
<b>Social Norms</b>		195 (73%)	74 (27%)	<0.01*

\*p-value <0.05, where the frequency of Option A > Option B

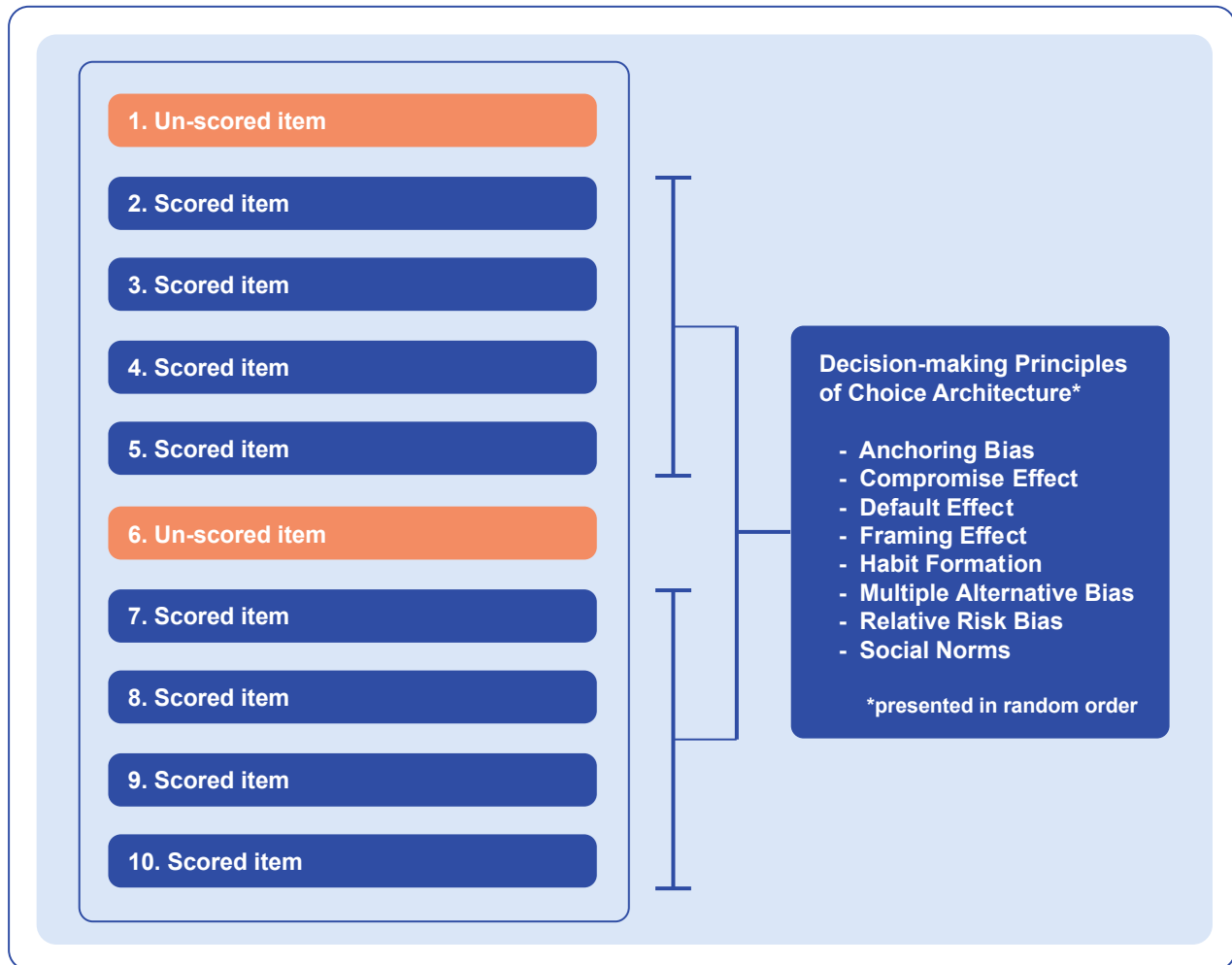
\*\*p-value <0.05, however, the frequency of Option A < Option B. Thus, the effect is in the wrong direction.

##### 3B. Scenarios presented to two subgroups of MTurk Participants: Group 1 (n=135) and Group 2 (n=135)

Principle		Presentation 1	Presentation 2	p-value
		Option A	Option A	
<b>Watchful Waiting vs. Active Surveillance</b>	n (%)	102 (77%)	95 (70%)	>0.05
<b>Compromise Effect</b>		133 (100%)	63 (46%)	<0.01*
<b>Relative Risk Bias</b>		113 (82%)	73 (55%)	<0.001*
<b>Framing Effect</b>		91 (69%)	66 (48%)	<0.001*
<b>Overrepresentation Bias</b>		87 (64%)	101 (75%)	>0.05
<b>Multiple alternatives Bias</b>		64 (49%)	41 (30%)	<0.01*
<b>Anchoring Bias</b>	mean (SD)**	39.1 (24.3)	32.5 (25.4)	<0.035*

\*p-value <0.05, where the frequency or mean of Option A in Group 1 > Option A in Group 2.

\*\*mean (SD) percent estimate of own risk was calculated because participants were asked to estimate their own risk, from 0-100%, of having a genetic disease after being anchored by a high (Group 1) or low (Group 2) number.

**Appendix 5. Layout of scenario-based questions for physicians**

## Appendix 6. Scenario-based questions for physicians

### Anchoring Bias

Scenario:

A woman at risk of a genetic disease is seeking medical advice.

Interaction 1:

While waiting, she is asked to write down the age of her youngest living relative.

Interaction 2:

While waiting, she is asked to write down the age of her oldest living relative.

At the start of the visit, you ask what her own estimated risk is before providing her with additional information. As compared to Interaction 1, Interaction 2 is likely to:

- A. **Increase her estimate of her own risk**
- B. Decrease her estimate of her own risk
- C. Will not influence her estimate

### Compromise Effect

Scenario:

Your patient has a medical condition that can be treated with medication.

Presentation 1:

As your physician, I recommend that you take one of these medications that will treat your medical condition.

Medication C: costs \$90 per month after insurance, works SOME of the time but has FEW side effects.

Medication Q: costs \$250 per month after insurance, works MOST of the time and has FEW side effects.

Presentation 2:

As your physician, I recommend that you take one of these medications that will treat your medical condition.

Medication C: costs \$90 per month after insurance, works SOME of the time but has FEW side effects.

Medication Q: costs \$250 per month after insurance, works MOST of the time and has FEW side effects.

Medication G: costs \$500 per month after insurance, works ALMOST ALL of the time and has FEW side effects.

As compared to Presentation 1, Presentation 2 increases the likelihood that the patient will choose:

- A. Medication C
- B. **Medication Q**
- C. Does not influence the likelihood the patient will choose any specific option

### Default Effect

Scenario:

Your patient needs a cardiology consultation. There are two physicians in the practice: Doctor A and Doctor B.

"The schedulers have set you up to see Doctor A. If you'd rather see Doctor B, just call this number and they will change your appointment for you."

This way of presenting options increases the likelihood that the patient will see:

- A. **Doctor A**
- B. Doctor B
- C. Does not influence the likelihood the patient will choose any specific option

### Framing Effect

Scenario:

You are presenting to the hospital administrator about a new outbreak of a disease. There are two proposed programs to combat this disease: Program A and Program B. You are the local expert in the unusual evidence base for these programs.

Presentation 1:

Program A: 25 out of 100 patients will be saved.

Program B: There is a 25% chance that all 100 patients will be saved and a 75% chance no patients will be saved.

Presentation 2

Program A: 75 out of 100 of the patients will die.

Program B: There is a 25% chance no patients will die and a 75% chance that all 100 patients will die.

As compared to Presentation 1, Presentation 2 increases the likelihood that the administrator will choose:

A. Program A

**B. Program B**

C. Does not influence the likelihood the patient will choose any specific option

### Habit Formation

Scenario:

Your patient needs to take medication on a daily basis. As the patient's physician, there are two equally effective medication regimens. The risks and benefits of each option are identical.

Regimen A: Take one tablet daily

Regimen B: Take one tablet three days a week

Which regimen is more likely to support medication adherence?

**A. Regimen A**

B. Regimen B

C. Regimen A and Regimen B will have similar adherence

### Multiple Alternatives Bias

Scenario:

Your patient has prostate cancer, for which there are multiple management options available. You describe the options available to the patient:

Presentation 1:

"You will need surgery to manage this cancer. You may also seek a second opinion"

Presentation 2:

"You will need either: laparoscopic surgery (a surgeon inserts cameras and tools through small skin incisions), robot-assisted surgery (a surgeon controls robotic arms through small skin incisions), or open surgery (a surgeon makes a single long skin incision). You may also seek a second opinion."

As compared to Presentation 1, Presentation 2 increases the likelihood that the patient will choose:

A. Surgery

**B. Second opinion**

C. Does not influence the likelihood the patient will choose any specific option



### Relative Risk Bias

Scenario:

You have a newly diagnosed lung cancer. As your physician, I recommend that you select either Procedure A or Procedure B. Both procedures are equally effective but have different risks. Both procedures are equally effective but have different risks.

Presentation 1:

Procedure A usually works and 20% of patients experience a complication.  
Procedure B may work and 10% of patients experience a complication.

Presentation 2:

Procedure A usually works to solve the problem while Procedure B may work. Procedure A is twice as likely to cause a complication as Procedure B.

As compared to Presentation 1, Presentation 2 increases the likelihood that the patient will choose:

- A. Procedure A
- B. Procedure B**
- C. Does not influence the likelihood that patient will choose either option.

### Social Norms

Scenario:

Your patient needs to take an anticoagulation medication. There are two options available: Medications A and B.

“As your physician, I recommend one of two medications that are equally effective in thinning your blood. Medication A is a once-daily pill that requires regular blood tests. Medication B is a once-daily shot that you give yourself under your skin, but it does not require blood tests. Many of my patients put up with the blood tests.”

This way of presenting options to the patient increases the likelihood that the patient will choose:

- A. Medication A**
- B. Medication B
- C. Does not influence the likelihood the patient will choose any specific option

### Unscored item 1

Scenario:

A patient is selecting a new primary care physician. His insurance company's website provides the patient with two options, in no particular order:

Presentation 1:

Dr. P  
Dr. K

Presentation 2:

Dr. P: \$25 co-pay; 40 min travel time from patient's home address  
Dr. K: \$35 co-pay; 20 min travel time from patient's home address

As compared to Presentation 1, Presentation 2 increases the likelihood that the patient will choose:

- A. Dr. P
- B. Dr. K
- C. Does not influence the likelihood the patient will choose any specific option**

**Unscored Item 2**

## Scenario:

You have been appointed to the hospital's Healthy Eating Committee. You have been assigned the job of reducing the number of calories consumed per meal by cafeteria customers. You can choose one of two pilot programs that the administration will support:

## Program 1:

Cafeteria customers may specifically request the cooks make high-calorie items such as pizza and hamburgers, but they will no longer be available as pre-made "grab and go" items.

## Program 2:

Place the salad bar at the cafeteria entrance, so that all customers must walk past the salad bar offerings in order to reach the rest of the food choices.

Which program will result in greater calorie reductions among cafeteria customers' meals?

- A. Program 1
- B. Program 2
- C. **Programs 1 and 2 will result in a similar reduction in calories**

**Appendix 7. Association between physicians' characteristics and choice architecture competency**

Characteristic	Estimate (95% CI)	p-value
<b>Age</b>		
Years	-0.03 (-0.14 – 0.08)	0.627
<b>Gender</b>		
Male	1.00	0.202
Female	-0.34 (-0.87 – 0.18)	
<b>Race</b>		
White	1.00	0.367
Black	0.70 (-0.78 – 2.18)	
Asian	-0.37 (-0.96 – 0.21)	
Other	-0.39 (-1.39 – 0.61)	
<b>Ethnicity</b>		
Non-Hispanic	1.00	0.865
Hispanic	0.15 (-1.64 – 1.95)	
<b>Medical specialty</b>		
Internal Medicine	1.00	0.275
Anesthesiology	-0.17 (-0.94 – 0.60)	
Emergency Medicine	-0.01 (-0.90 – 0.89)	
Surgery	0.11 (-0.75 – 0.97)	
Other	0.64 (-0.03 – 1.31)	
<b>Political views</b>		
Liberal	1.00	0.981
Conservative	0.13 (-0.96 – 1.23)	
Moderate	-0.05 (-0.62 – 0.52)	
Other	-0.20 (-1.70 – 1.31)	
<b>Political party</b>		
Democrat	1.00	0.571
Republican	0.33 (-0.47 – 1.12)	
Libertarian	0.49 (-0.99 – 1.98)	
Other	-0.28 (-0.98 – 0.43)	