**Northern California Training Academy
Fundamentals in Evidence-based Decision-Making**

SESSION 2: Developing a hypothesis

November 21, 2019

Laura Packard Tucker, Wendy Wiegmann

The Center for State Child Welfare Data
Chapin Hall at the University of Chicago

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago   1

Today's agenda:

9:00 – 9:30	Welcome back
9:30 – 10:30	A closer look at few core concepts
10:30 – 10:45	Stretch break
10: 45 – 12:00	Recap and review your group work to date: "I observe that…I think it's because…"
12:00 – 1:00	Lunch break
1:00 - 2:00	"So I plan to…which I think will result in…" – identifying an intervention that is rooted in theory, if not evidence.
2:00 – 2:15	Stretch break
2:15 – 3:15	Group work: crafting a plan
3:30 – 3:45	Assign homework & review what's coming next
3:45—4:00	Conclude

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago   2

Last time…

I observe [**some outcome that I want to improve**]. ✔

I think it's because of [**this reason**].

So I plan to [**implement this intervention**],

which I think will result in [**an improved outcome**].

- Most of you worked with FCDA administrative data analyses to make an **observation** about **permanency within 12 months of entry** in your county and to identify a problem that needs solving.

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago   3

Theory of change
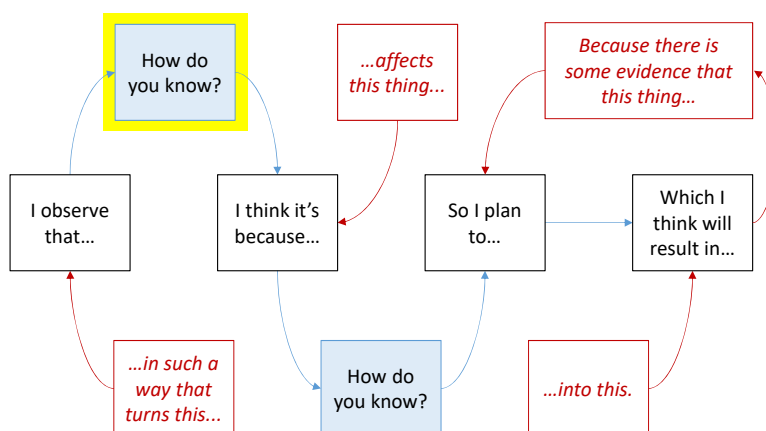
© The Center for State Child Welfare Data   The State Center for Child Welfare Data | Chapin Hall at the University of Chicago   4

Some important concepts

1.

Case review:
Who should you compare to whom?

Example…

I observe that **younger** children are **less likely** to achieve permanency in 12 months compared to children placed at **older ages**.

I think it's because my county does not have access to very good **age-appropriate parenting programs** for parents of younger children.

You may propose… I bet if I **compared younger children who exited to permanency to those who didn't**, I would find that the parents of those who achieved permanency within 12 month received age-appropriate parenting support while their children were in care.

Among…	I expect to see that…
Younger children who exited to permanency within 12 months	…parents **did** have age appropriate parenting support
Younger children who did not achieve permanency within 12 months	…parents **did not** have age appropriate parenting support

But you may suppose that this is pretty rare…

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago

---

In order build an argument that a lack of age-appropriate parenting support is the thing that makes **young children less likely than older children** to exit to permanency in 12 months (which is your observation), you'll need to compare children based on age.

Among children placed …	I expect to see that…	
	Exits to perm within 12 months	Did not exit to perm within 12 months
Under 6	…parents **did** have age appropriate parenting support	…parents **did not** have age appropriate parenting support.
6 and older	…parents **did** have age appropriate parenting support.	…parents **did** have age appropriate parenting support.

Therefore… the **question** for the case review is:

Among the cases reviewed, how many had parents who received age-appropriate parenting support while the child was in care?

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago

2.

Random sampling and random samples from stratified selections

---

Among the cases reviewed, how many had parents who received age-appropriate parenting support while the child was in care?

How do I select a case review sample to answer this question?

Let's say 1,000 children entered care in 2014 and 33% of them exited to permanency within 12 months:

	Perm < 12m	No perm < 12 m	Total
	Number		
Under 6	170	470	640
6 +	163	197	360
Total	333	667	1,000
	Percent of **grand total**		
Under 6	17%	47%	64%
6 +	16%	20%	36%
Total	33%	67%	100%

If we draw a **random sample** of 40 cases, we're **probably** going to wind up with this:

	Perm < 12m	No Perm < 12 m	Total
Under 6	7	18	25
6+	7	8	15
Total	14	26	40

Representative of the population with respect to age and outcome…but unequal and tiny cell sizes

If you want equal cell sizes, you could draw a random sample based on the combinations of the outcome of interest and the variable you think affects it.

- Create the table first and then draw a random sample from each cell.

Let's say 1,000 children entered in 2014 and 33% of them exited to permanency within 12 months:

	Perm < 12m	No Perm < 12 m	Total
	Number		
Under 6	170	470	640
6 +	163	197	360
Total	333	667	1,000
	Percent of **grand total**		
Under 6	17%	47%	64%
6 +	16%	20%	36%
Total	33%	67%	100%

If we draw a **random** sample of 40 cases in this way:

	Perm < 12m	Perm < 12 m	Total
Under 6	10	10	20
6 +	10	10	20
Total	20	20	40

Representative *within each combination* but not *representative of the population as a whole.*

Equal cell sizes that are as large as manageable

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago

---

A word on sample size…

We conduct case review in order to acquire rich, qualitative data on the process and quality of care.

We select a sample because a review of all cases in the population would be prohibitive.

Random sampling gives us the best chance of reviewing a **representative** sample.

	Perm < 12m	No Perm < 12 m	Total
Under 6	10	10	20
6+	10	10	20
Total	20	20	40

That said, we should still extrapolate from case review with a **caveat** about **generalizability**.

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago

3.

The difference between a fraction that describes the characteristics of population and one that describes the likelihood of an outcome

What do we mean when we talk about **likelihood**?

First off, try to reserve the word **likelihood** for referring to the **likelihood of an outcome.**

- The likelihood of entering foster care.

- The likelihood of exiting to permanency.

- The likelihood of reunifying within six months.

- The likelihood of experiencing 2 or more placement moves.

- The likelihood of spending time in a congregate care setting.

- The likelihood of aging out of foster care.

- The likelihood of re-entering care within 12 months of reunification.

What do we mean when we talk about **likelihood**?

Second, recognize the synonyms.

When we ask "What is the **likelihood** that…?"

We're asking:

- What are the **odds**?

- What are the **chances**?

- What is the **probability**?

What do we mean when we talk about **likelihood**?

Probability is usually expressed as a rate (i.e., a percentage). $\frac{\text{Numerator}}{\text{Denominator}}$

1,000 entered care in Acme County in 2014 and 333 of those children achieved permanency within 12 months.

- **Rate of permanency within 12 months = 333/ 1000 = 33%**

Make a statement about what **actually** happened:

"Of all children who entered care in Acme County in 2014, 33% exited to permanency within 12 months."

Use that fact to predict what is **likely** to happen in the future:

"Children entering care in Acme County have about a 33% *likelihood* of exiting to permanency within 12 months."

Variables that predict the likelihood of an outcome

Different factors may increase or decrease **the likelihood of timely permanency.**

These factors are known as predictors or independent variables.
- e.g., child's age at placement

The outcome is the dependent variable (it "depends" on the independent variable)

Independent variable	Permanency within 12 months? (Dependent variable)					
	Number			Percent		
	Perm Exit < 12 m	No Perm Ex < 12 m	Total	Perm Exit < 12 m	No Perm Ex < 12 m	Total
Total entered care	333	667	1,000	33%	67%	100%
Age at placement						
Under 6 y.o.	170	470	640	27%	73%	100%
6 y.o. and older	163	197	360	45%	55%	100%

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago

Measures of likelihood…

Categorize children by the PREDICTOR…

…to explain variation in the OUTCOME "How many [experienced this]?"

The risk set ("of all children who entered…")

Independent variable	Permanency within 12 months? (Dependent variable)					
	Number			Percent		
	Perm Exit < 12 m	No Perm < 12 m	Total	Perm Exit < 12 m	No Perm Exit < 12 m	Total
Total Entries	333	667	1,000	33%	67%	100%
Age at placement						
Under 6 y.o.	170	470	640	27%	73%	100%
6 y.o. and older	163	197	360	45%	55%	100%

Row percent

"Among the children who reunified, younger children (under 6) **were less likely** (27%) **to exit to permanency** within 12 months than children placed at age 6 or older (45%)."

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago

---

But sometimes, fractions…

…And describe the CHARACTERISTICS of each group.

Categorize children by the OUTCOME…

	Independent variable	Permanency within 12 months (Dependent variable)		
		Perm Exit < 12 m	No Perm Ex < 12 m	Total
Number	Total Entries	333	667	1,000
	Age at placement			
	Under 6 y.o.	170	470	640
	6 y.o. and older	163	197	360
Percent	Total reunified	100%	100%	100%
	Age at placement			
	Under 6 y.o.	51%	70%	64%
	6y.o. and older	49%	30%	36%

Column percent

Not the risk set! ("of all children who exited to perm within 12 months…")

"Selecting on the dependent variable"

"Of children who exited to permanency within 12 months, 51% were 5 or younger at placement and 49% were placed at age 6 or older."

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago 20

"Of children who exited to permanency within 12 months, 51% were under 6 at placement and 49% were placed at age 6 or older."

	Independent variable	Permanency within 12 months? (Dependent variable)		
		Perm Exit < 12 m	No Perm < 12 m	Total
Number	Total entries	333	667	1,000
	Age at placement			
	Under 6 y.o.	170	470	640
	6y.o. and older	163	197	360
Percent	Total Entries	100%	100%	100%
	Age at placement			
	Under 6 y.o.	51%	70%	64%
	6 y.o. and older	49%	30%	36%

*This makes me think: If the group who achieve permanency about equally divided between older and younger children, then does that mean that all enterers are **about equally likely to achieve timely permanency**?*

No, in fact the previous slide shows us that is not true: "Among the children who reunified, children placed as infants were less likely to exit to perm (27%) within 12 months than children placed at age 6 or older (45%)."

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago   21

WHY DOES IT MATTER?

It's important to be precise! The denominator is really important.

Of children who were under six at entry, what proportion exited to permanency within 12 months of entry?

170/640 = 27%

Of children who exited to permanency within 12 months of placement, what proportion were placed as babies?

170/333 = 51%

Which of these percentages are we trying to change?

*Creating your fraction too hastily could lead you to make an incorrect statement about the **likelihood** of permanency children under 6 at placement…*

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago
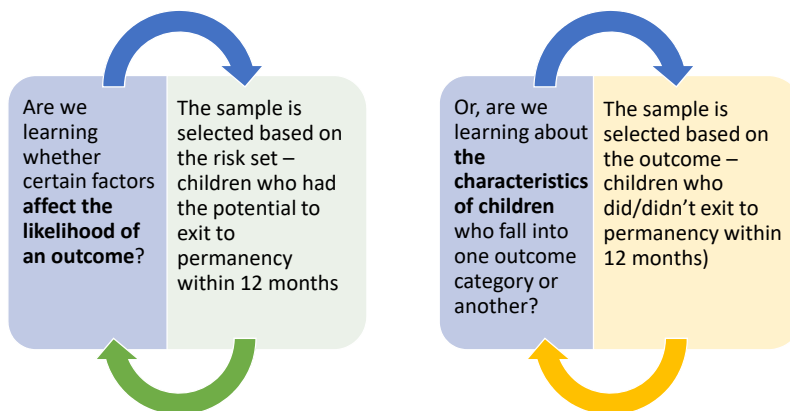
WHY DOES IT MATTER?

We are trying to predict the **likelihood of an outcome**. **Not all fractions describe the likelihood of an *outcome*… check your denominator!**

Does your denominator reflect the risk set?

Yes!   *Nope!*
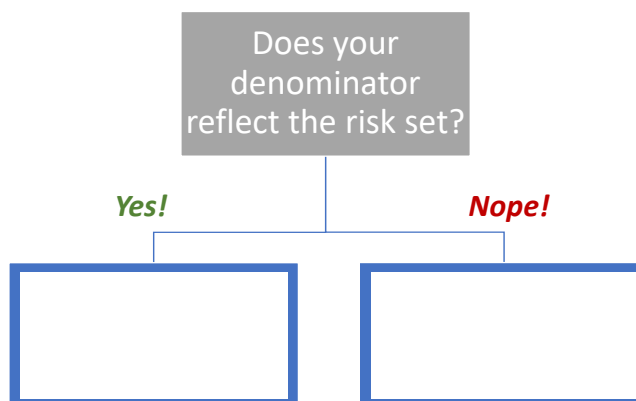
The State Center for Child Welfare Data | Chapin Hall at the University of Chicago

---

Fine, but what does this have to do with case review?

When generating evidence from administrative data, statements about likelihood require you to appreciate the risk set. ***The same is true for statements resulting from case record review.***

Are we learning whether certain factors **affect the likelihood of an outcome**?

The sample is selected based on the risk set – children who had the potential to exit to permanency within 12 months

Or, are we learning about **the characteristics of children** who fall into one outcome category or another?

The sample is selected based on the outcome – children who did/didn't exit to permanency within 12 months)

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago

12

Case review set you up to answer THIS: *Of children who did/didn't achieve timely permanency* *what percent had parents who received age-appropriate parenting support while the child was in care?*

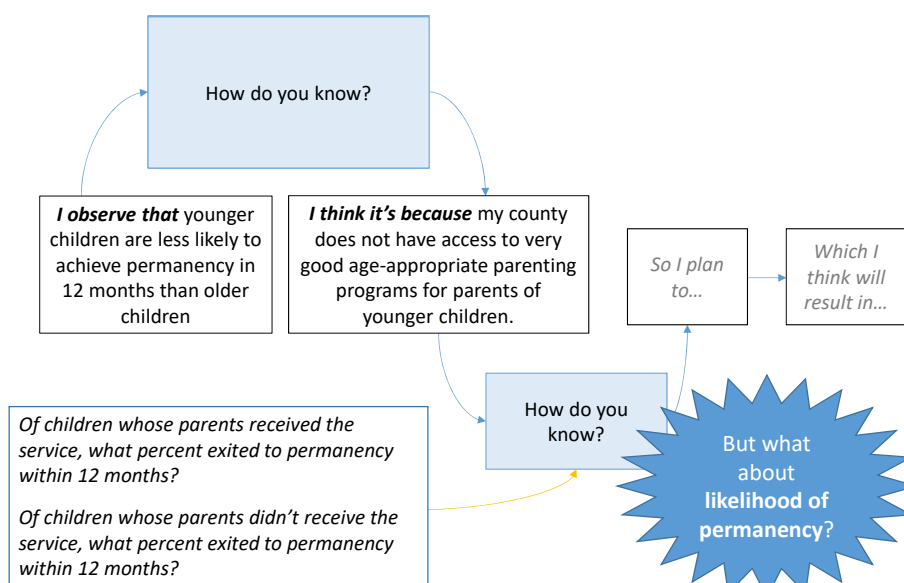|		Number		
		Perm <12	No Perm<12	Total
Number	Under 6	10	10	20
	AAPS	4	2	6
	No AAPS	6	8	14
	6 and older	10	10	20
	AAPS	9	7	16
	No AAPS	1	3	4
Percent	Under 6	100%	100%	100%
	AAPS	40%	20%	30%
	No AAPS	60%	80%	70%
	6 and older	100%	100%	100%
	AAPS	90%	70%	80%
	No AAPS	10%	30%	20%

Sample is based on the outcome category:
Descriptive statistics (column percent)

- In general, infants received the service less frequently (30%) than older children (80%).

- Among all children, permanency cases got the service more often (40%, 90%) than non-perm (20%, 70%).

- Among children who did not exit to permanency within 12 months, not getting the service was more common for younger cases (80%) than it was for older enterers (30%).

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago

---

What do we know at this point?

How do you know?

I observe that younger children are less likely to achieve permanency in 12 months than older children

I think it's because my county does not have access to very good age-appropriate parenting programs for parents of younger children.

So I plan to…

Which I think will result in…

Of children whose parents received the service, what percent exited to permanency within 12 months?

Of children whose parents didn't receive the service, what percent exited to permanency within 12 months?

How do you know?

But what about **likelihood of permanency**?

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago

26

We can get a sense of that (at least among the reviewed cases) by changing the denominator: *Of children whose parents received the service, what percent achieved permanency within 12 months?*   **Sample is based on the risk set (row percent)**

	Number			Percent		
	Perm <12	No Perm <12	Total	Perm <12	No Perm <12	Total
Under 6	10	10	20	50%	50%	100%
AAPS	4	2	6	67%	33%	100%
No AAPS	6	8	14	43%	57%	100%
6 and older	10	10	20	50%	50%	100%
AAPS	9	7	16	56%	44%	100%
No AAPS	1	3	4	25%	75%	100%

- Younger children whose parents got the service were more likely to achieve permanency within 12 months (67%) than those whose parents didn't (43%).

- The same was true for older children (56%, 25%). In fact, it seems like not receiving the service might have had an even stronger effect on the older children (75% did not achieve permanency within 12 months) than younger children (57%)

- But as we saw a moment ago, it was relatively rare for an older child not to get the service (4/20 = 20%) and much more likely for an a younger child (14/20 = 70%).
The State Center for Child Welfare Data | Chapin Hall at the University of Chicago

Break time!

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago   28

"I observe that… I think it's because…"
…and the supporting evidence.

What did you discover?

Your homework: Building the argument

- Your "I observe that…" statement along with its supporting evidence

- Your "I think it's because…" hypothesis

- An explanation of how you explored that hypothesis (i.e., an explanation of what questions you asked of whom)

- Your main findings from that exercise

- A statement about whether your hypothesis was supported
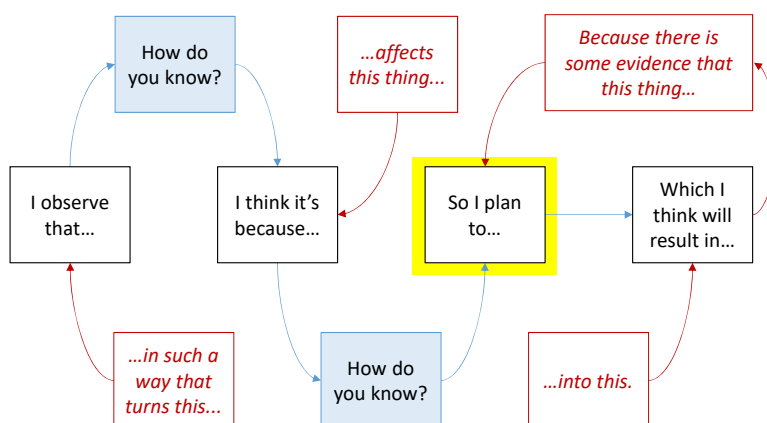
Let's talk about what you found…

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago
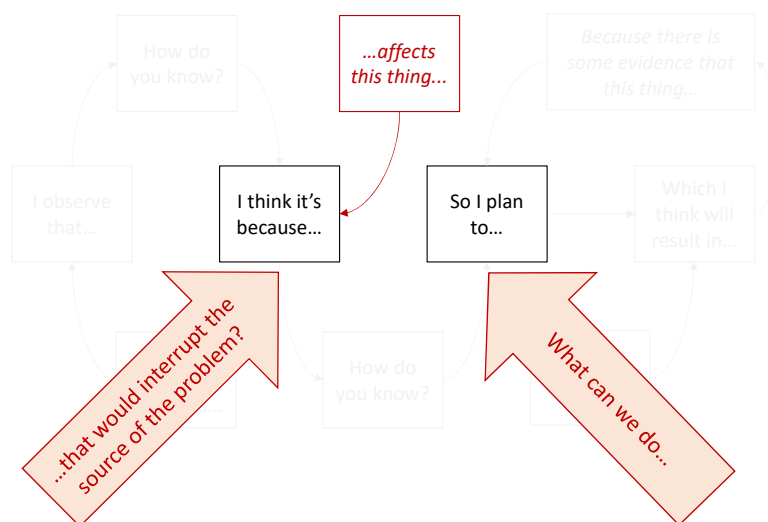
31

Lunch!

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago

32

So I plan to…

Theory of change

How do you know?

I observe that…

…affects this thing…

Because there is some evidence that this thing…

I think it's because…

So I plan to…

Which I think will result in…

…in such a way that turns this…

How do you know?

…into this.

Developing an intervention…

Proposed Solution to Your Theory of Change

You have observed the problem and have solidified your hypothesis as to its cause. Next you must make the argument for why your proposed solution can solve the problem.

Intervention Components	Anticipated Change	Evidence
• What are the components of the intervention? • What will people do and when?	• **Why** is each component expected to produce the change you want to see? • **How** is each component expected to produce the change you want to see?	• Is there any evidence to support the claim that this component will bring about the change you want to see? • If yes, lay that out. • If not, what, at least, is the theory?

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago 36

REU practicum logic model

I observe that child welfare managers do not typically use evidence generated from administrative data to fuel their CQI decision-making.

I think it's because child welfare managers need to strengthen their REU knowledge and skills

So I plan to implement an REU training program…

…which I think will result in participants using administrative data correctly and more frequently throughout the CQI process.

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago   37

REU practicum logic model

What is the rationale for implementing this particular intervention? LOGIC MODEL

Component	How will this bring about the change I want to see?	Is there any evidence that this will work? If not, what, at least, is the theory?
Classroom based learning	Curriculum imparts new knowledge about best practices in measurement.	Pre/post tests from previous cohorts showing that knowledge improved.
Drills that involve practice with actual, available evidence sources	Repeated drills will make students more familiar with available evidence sources; skills will improve with practice.	Research literature on REU interventions noting the essential role of actual evidence sources. Research literature supporting the importance of repetition in learning new skills.
Group project in which students apply skills to a job relevant issue	Students will be more motivated to use evidence when they see the application to a real life scenario they are confronting.	Adult education literature; transfer of learning is optimized when project work links knowledge and skills to job-relevant tasks.
Coaching from experts	Coaches help students move up the learning curve and integrate new knowledge.	Coaching literature; transfer of learning is improved when experts facilitate learning process.

The State Center for Child Welfare Data | Chapin Hall at the University of Chicago

So I plan to…

Even if you have not gathered evidence to confirm your hypothesis, continue with this thought exercise…

Continue developing a theory of change: What can we do that would interrupt the source of the problem?

- What is the intervention? A change to process? Quality? Capacity?
- What makes you think that the intervention will bring about the change you want to see?

Consider feasibility…
- What does the intervention entail?
  - What needs to get done?
  - Who will do it and when?
- What resources does the intervention require? (time, money, supplies…)

Homework - Between now and next time

Continue fleshing out your theory of change
(Homework sheet on the Resource Barn)

1. Write a paragraph that summarizes your idea for your intervention. Make sure it starts like this:

I observe that _____. I think it's because_____. So I plan to...

2. Use the logic model template to start articulating your theory of change.

Due dates

December 13	Email your assignment to Laura, Daniel, & Wendy
January 6	Receive feedback from Laura, Daniel, & Wendy
January 14	Email your revised/final assignment to Laura, Daniel, & Wendy so they can be shared with Anita in advance of Session 3 (January 21).